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VINTAGE STUDY

1981

DEPARTMENT OF THE ARMY
INDUSTRIAL PLANT EQUIPMENT
(IPE)



US ARMY INDUSTRIAL BASE ENGINEERING ACTIVITY
ROCK ISLAND, ILLINOIS

61299

PREFACE

This study was conducted in compliance with paragraph 1-11, AR 700-90. It is an analysis of Department of the Army industrial plant equipment, active and inactive, based on year of manufacture. A comparison of active Government equipment with private industry is made based on three age groups: 0-9 years old, 10-19 years old, and 20 years or older. The equipment status within the US Army Materiel Development and Readiness Command (DARCOM) is presented for six classes of IPE for the major subordinate commands and laboratories and centers. The vintage (age distribution) and quantity and percent exceeding useful service life are portrayed for each class. The status of numerical control (NC) equipment is presented showing the classes, quantity and use, and trends of the inventory.

VINTAGE STUDY

1981

Department of the Army
Industrial Plant Equipment
(IPE)

PREPARED BY

A handwritten signature in cursive script, reading "Frank T. Bogdanowicz". The signature is written in dark ink and is positioned above the printed name and title.

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VINTAGE STUDY

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INTRODUCTION

This study is an analysis of Department of the Army industrial plant equipment (IPE) based on year of manufacture. Six types of IPE are considered: metalcutting, welding, metalforming, heat treating and furnaces, electrical testing and measuring, and mechanical testing and measuring equipment. Illustrations of each type and the selected Federal Supply Classes (FSC) are contained in Appendix A. The age of the equipment is illustrated by sorting it into three age groups: 0 to 9 years old, 10 to 19 years old, and 20 years or over. On this basis, Government equipment is compared with private industry. This comparison provides a means to evaluate whether the acquisition of IPE within the Department of the Army is keeping pace with private industry. A comparison of equipment age with useful service life is also included.

The DIPEC SP-57 Report, dated 13 June 1981, The Central Inventory of IPE Report as of 31 December 1980, and the DIPEC SP-50 Report as of 1 May 1981 served as the source documents for Government equipment. Industry data was obtained from the Tenth, Eleventh, and Twelfth Inventories of Metalworking Equipment published in 1968, 1973, and 1978, respectively, by the American Machinist Magazine, a McGraw-Hill publication.

Equipment age is not necessarily the best or only criteria to determine usefulness or capability. Other factors such as use and maintenance strongly influence a machine's serviceability. However, equipment age does provide a convenient yardstick by which a comparison can be made.

It is reasonable to assume that production equipment used by private industry is subjected to essentially uninterrupted service, necessitating earlier replacement. On the other hand, much of the Government equipment is used intermittently. Generally, equipment of a more recent year of manufacture possesses improved operating characteristics, and it follows that the newer equipment possesses improved production capabilities. But, items of equipment with an older year of manufacture may perform very satisfactorily for a given, specific purpose.

This study is not concerned with all these detailed considerations, but concentrates on equipment age only.

SECTION I

DEPARTMENT OF THE ARMY

The Department of the Army (DA) inventory of industrial plant equipment (IPE) consists of 118,679 items with an acquisition cost of \$1.609 billion.

Metalworking equipment, consisting of metalcutting and metalforming equipment, constitute the heart of an industrial facility and, as such, provides a good indication of productive capacity. The status of the Department of the Army inventory is shown in Figure I-1. The total inventory was decreasing until 1977. The changes since 1973, however, have been so small that the number is nearly constant.

Annual inventory status changes for active and inactive equipment are shown in Figure I-2. The quantity of active equipment has been decreasing since 1967, influenced primarily by the reduction in procurement to support the Vietnam War. Some, but not all, of this equipment has been retained in plant equipment packages, resulting in increases to inactive equipment during the period 1970--1973. Since then, changes have been relatively small. The increase of inactive equipment in 1978 was caused by the transfer of Navy PEP's to the Army as part of the single manager for conventional ammunition.

The US Army Materiel Development and Readiness Command (DARCOM) controls 105,590 items, or 89 percent, of the Department of the Army (DA) inventory. As shown in Figure I-3, DARCOM is the major user of IPE within DA.

In view of this, it is clear that the items controlled by DARCOM can be considered representative of DA.

ACTIVE EQUIPMENT

Most of the equipment controlled by DARCOM, 77,407 items or 73 percent, is active. The quantity and percent of selected classes of this equipment exceeding useful service life is shown in Figure I-4.

The quantity and percent exceeding useful service life continues to be unfavorable. It varies from 33 percent for welding equipment to 65 percent for metalforming equipment. In 1986, five years from now, these percentages will increase to 51 percent and 73 percent respectively. Metalcutting and metalforming equipment have the highest percent exceeding useful service life. This is significant because of the relatively higher cost of these items. However, electrical testing and measuring equipment with 11,149 items, is the class with the greatest number exceeding useful service life. Metalcutting equipment is a close second with 10,239 items and metalforming equipment is a distant third with 2,572 items.

The vintage (age distribution) of active equipment is shown in Figure I-5. Metalcutting equipment is the oldest with 11,427 items, or 70 percent, 20 or more years old. Welding equipment is the newest with 818 items, or 39 percent, less than ten years old.

INACTIVE EQUIPMENT

The vintage (age distribution) of DARCOM inactive equipment is shown in Figure I-6. As might be expected, the inactive equipment has an older age profile than does the active equipment. Metalcutting equipment has the highest number, 11,307 items, and the highest percent, 90 percent, in the 20 year and over age group. Percentage wise, metalforming equipment is a close second with 87 percent 20 years old or older, but far behind in quantity with only 3,023 items. Welding equipment has the most favorable age profile with 29 percent less than ten years old, but amounts to only 114 items.

INVENTORY OF METALWORKING EQUIPMENT

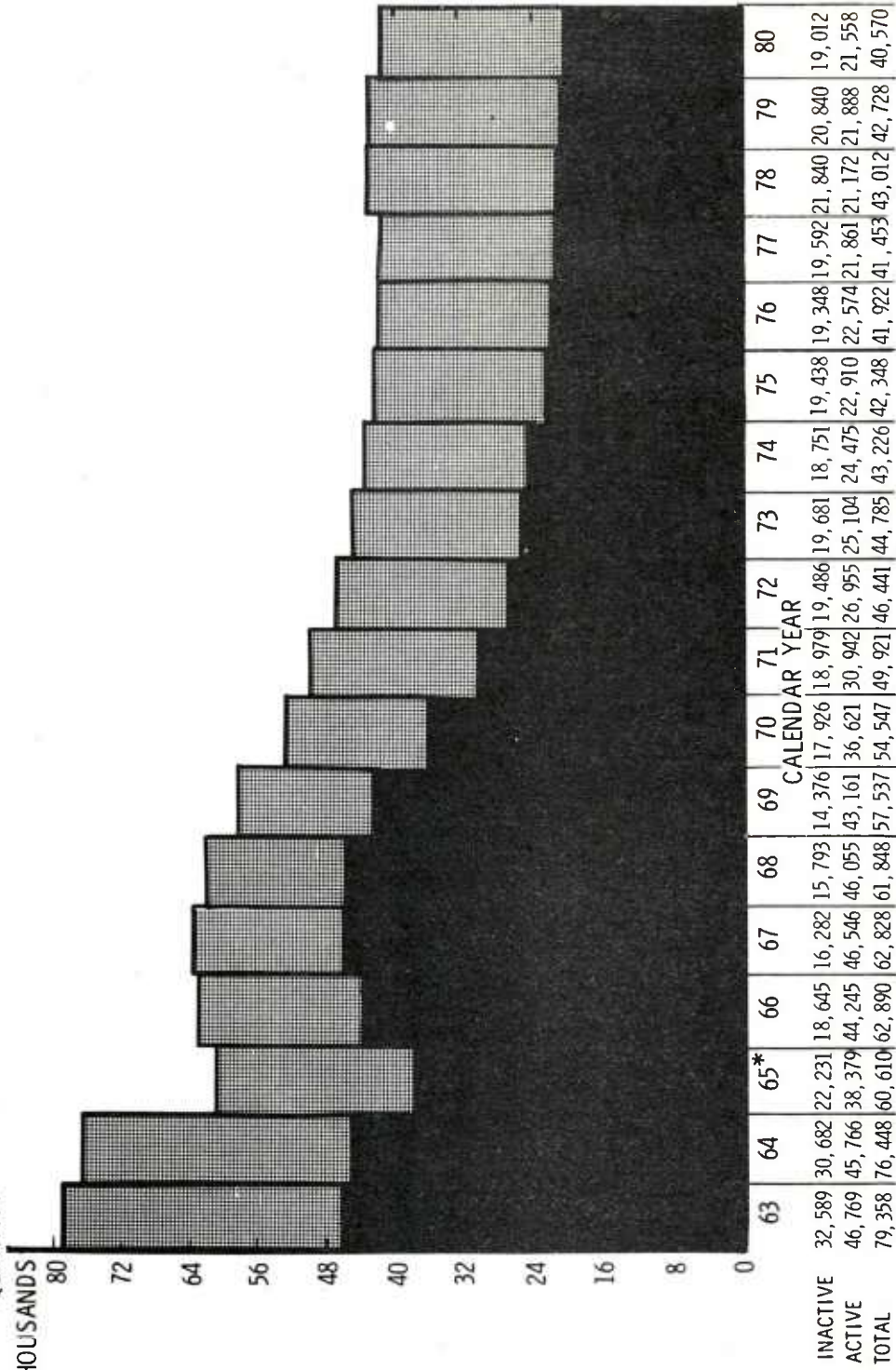
DEPARTMENT OF THE ARMY

ACTIVE INACTIVE



QUANTITY

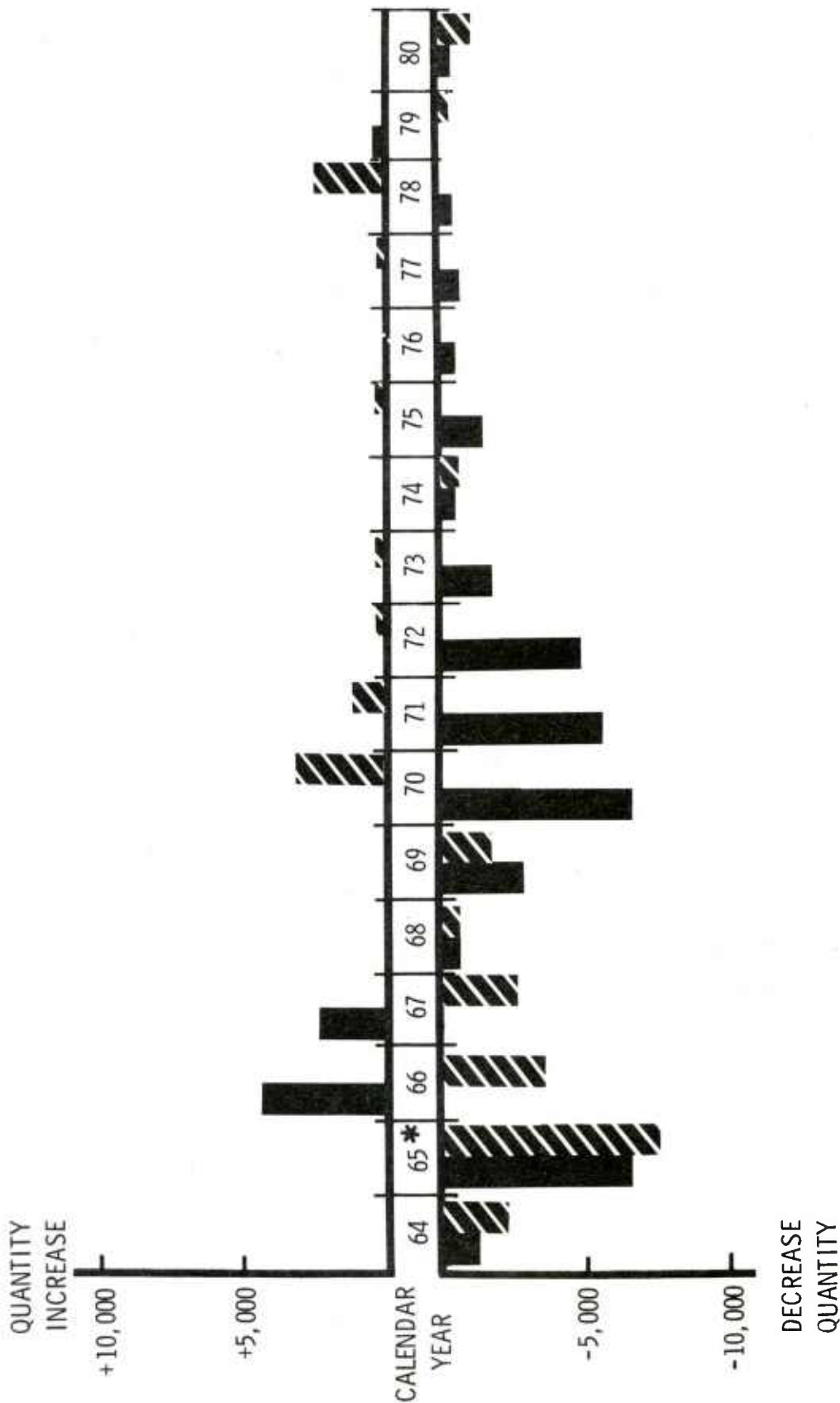
THOUSANDS



*ITEMS OF LESS THAN \$1,000 ACQUISITION COST WERE DROPPED FROM DA CENTRAL INVENTORY OF INDUSTRIAL PLANT EQUIPMENT REPORTS (CIPER)

FIGURE 1-1

INVENTORY STATUS CHANGES DEPARTMENT OF THE ARMY METALWORKING EQUIPMENT



*ITEMS OF LESS THAN \$1,000 ACQUISITION COST WERE DROPPED FROM DA CENTRAL INVENTORY OF INDUSTRIAL PLANT EQUIPMENT REPORTS (CIPER)

FIGURE 1-2

INDUSTRIAL PLANT EQUIPMENT



FIGURE I-3

1981 1986

ACTIVE EQUIPMENT

QUANTITY & PERCENT EXCEEDING USEFUL SERVICE LIFE

DARCOM

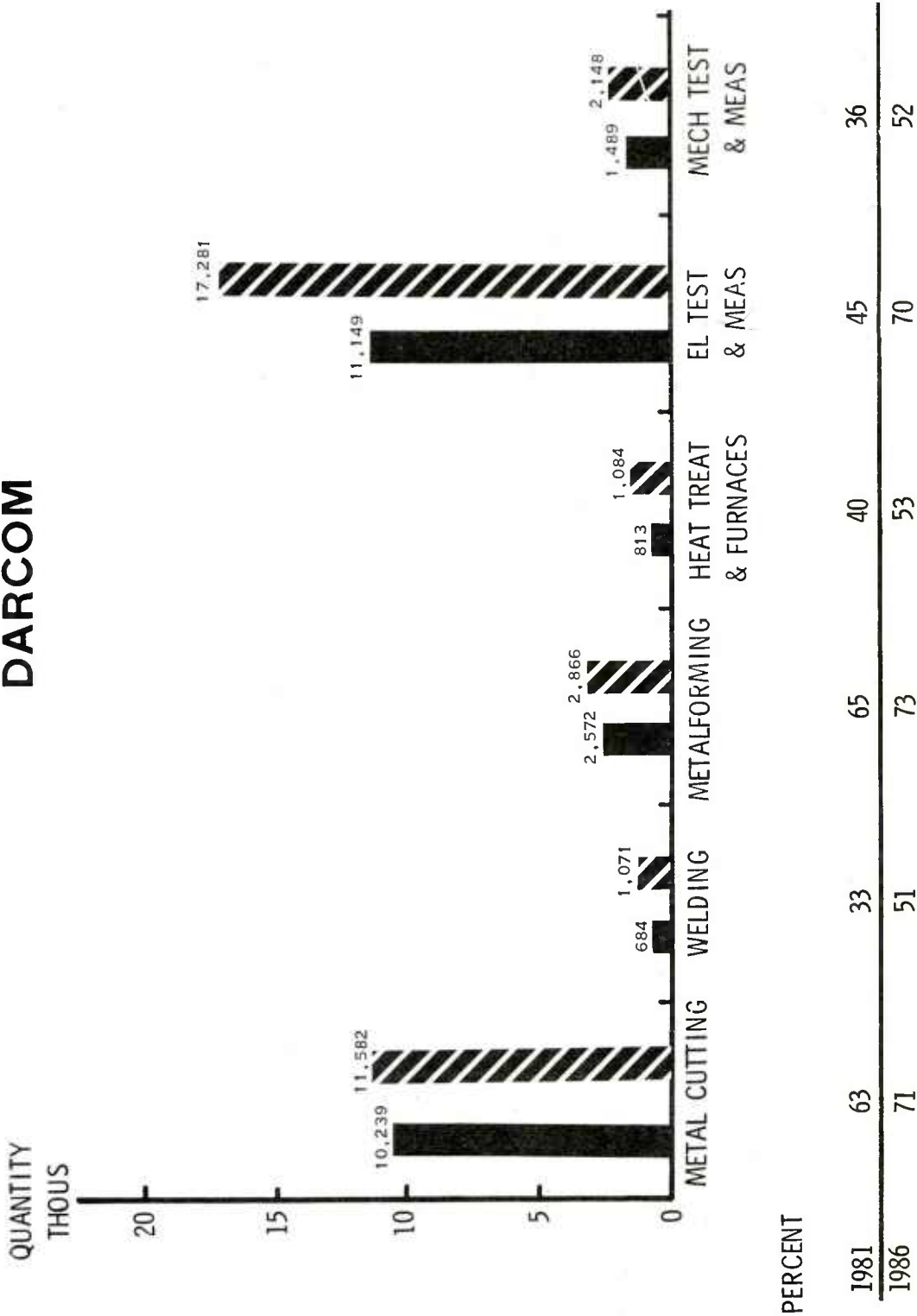


FIGURE 1-4

ACTIVE EQUIPMENT VINTAGE

DARCOM

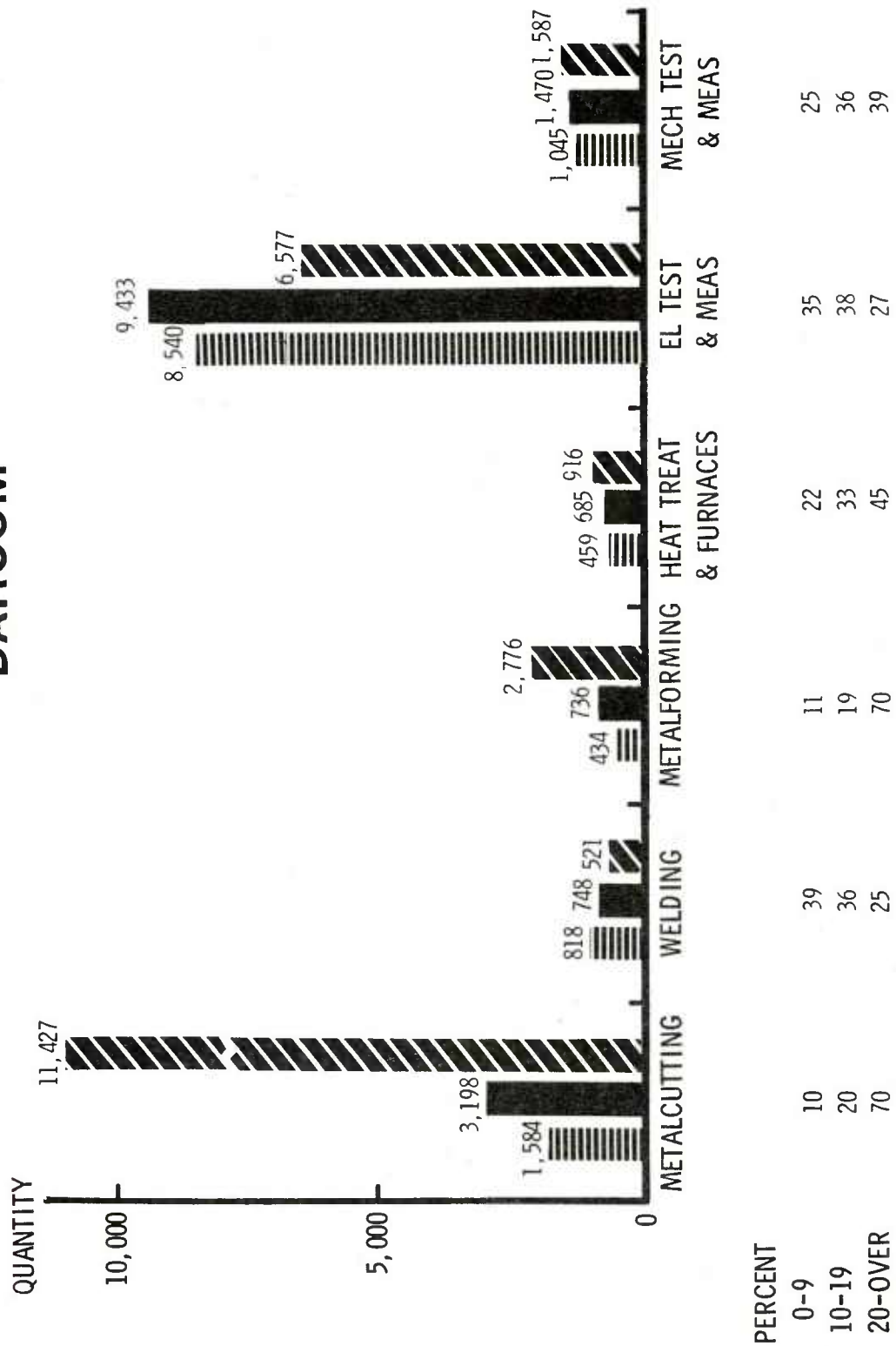


FIGURE 1-5

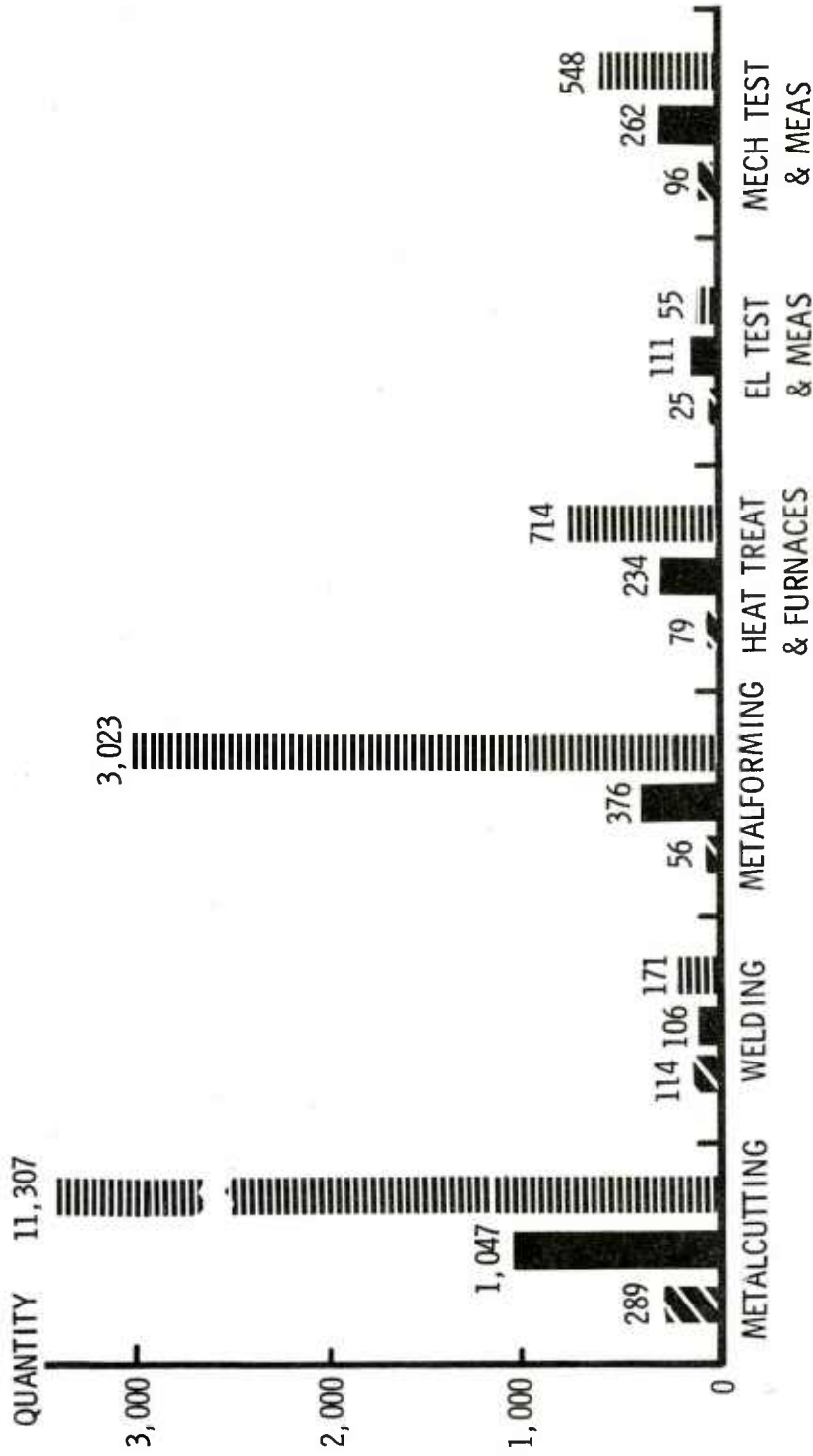
0-9 10-19 20-OVER



INACTIVE EQUIPMENT

VINTAGE

DARCOM



PERCENT

PERCENT	0-9	10-19	20-OVER
METALCUTTING	2	8	90
WELDING	29	27	44
METALFORMING	2	11	87
HEAT TREAT & FURNACES	8	23	69
EL TEST & MEAS	13	58	29
MECH TEST & MEAS	11	29	60

FIGURE I-6

SECTION II

DARCOM vs. INDUSTRY

An age comparison of DARCOM and private industry equipment is shown in Figure II-1. The data for DARCOM was obtained from previous Vintage Studies. Private industry data was obtained from the Tenth, Eleventh, and Twelfth Inventories of Metalcutting Equipment published in 1968, 1973, and 1978, respectively, by the American Machinist Magazine, a McGraw-Hill publication.

METALCUTTING AND METALFORMING EQUIPMENT

The age profile of DARCOM equipment is strongly influenced by the significantly large portion of the inventory that was acquired during the period 1950 to 1954. As a result, the age of the metalcutting and metalforming inventory has shifted from the 10-19 year range in 1968 to the 20 year and over range in 1973 and 1978. This shift also reflects a replacement level that has not kept pace with the aging of the inventory.

Private industry, on the other hand, exhibits a relatively consistent investment in replacement of equipment. As a result, the equipment operated by private industry has a much better age profile than the equipment available to the Army. Private industry takes greater advantage of the improved operating characteristics and production capabilities of newer equipment.

JOINING (WELDING) EQUIPMENT

The nature of the equipment classified as joining equipment by private industry and welding equipment by the Army appears to be a dominant factor. Private industry and DARCOM equipment exhibit similar status in this classification. The shorter useful life which requires earlier replacement seems to be the major reason for this similarity.

TRENDS

Private industry appears to have reduced their investment in equipment replacement over the years. A definite decrease in newer equipment, 0-9 years old, and an increase in older equipment, 20 years and older, is evident. In spite of this, the Army is still in an unfavorable position compared to private industry.

The number of items less than ten years old and those 10 to 19 years old provide an indication of the equipment replacement during those time frames. In the last ten years, only 1,584 metalcutting items and 434 metalforming items were added to the inventory. During the previous ten years, 3,198 metalcutting items and 736 metalforming items were added to the inventory.

The number of items that would have to be replaced to make DARCOM's age profile comparable to private industry is large. It would require replacement of 5,916 metalcutting items and 1,395 metalforming items. From these figures it can be seen that the replacement rate for DARCOM is much too low.

Estimating the cost to purchase the equipment to cause the inventory of DARCOM metalcutting and metalforming equipment to be comparable to private industry is difficult due to the extreme range of acquisition cost for this equipment. A review of the FY 81 projects revealed that the price range for items approved for acquisition ranged from \$2,905 to \$425,500. The average cost of all IPE as of June 1981 was \$14,054. Because of the wide range in the acquisition cost for industrial plant equipment, average acquisition cost is of limited value. Recognizing this, a very rough estimate of the cost to make the Army's inventory comparable to private industry is approximately \$102,749,000.

DARCOM AND INDUSTRY AGE COMPARISON

YEARS
0-9 10-19 20-OVER

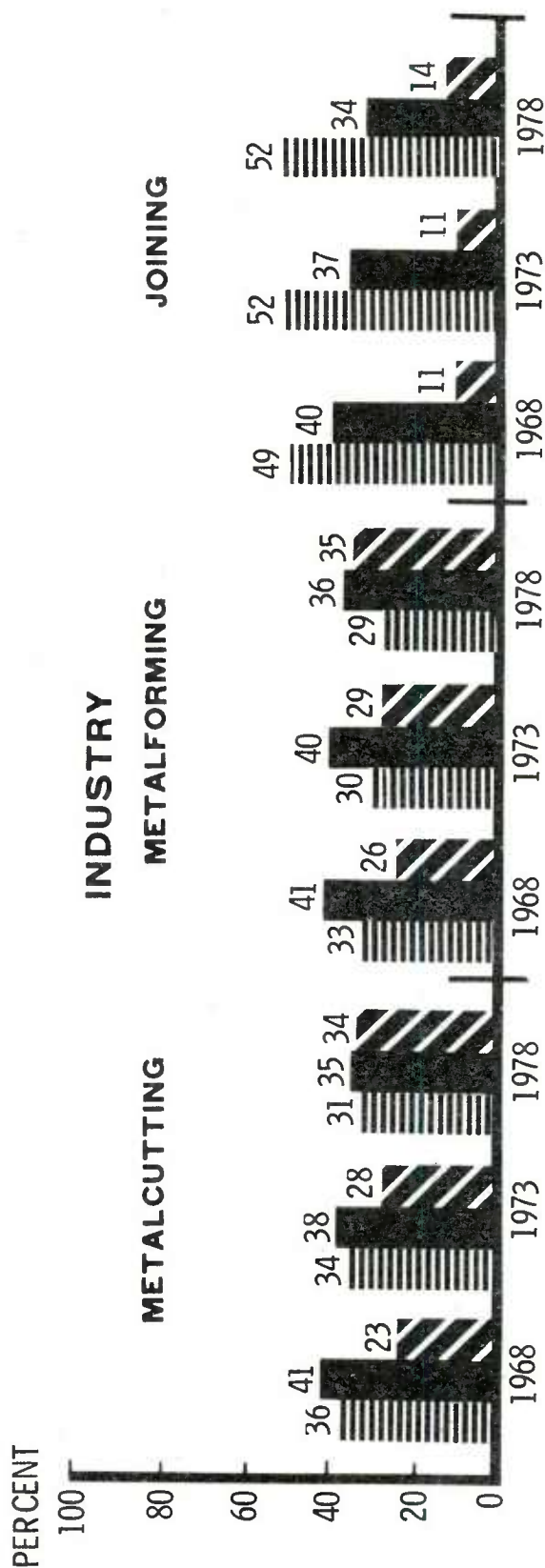
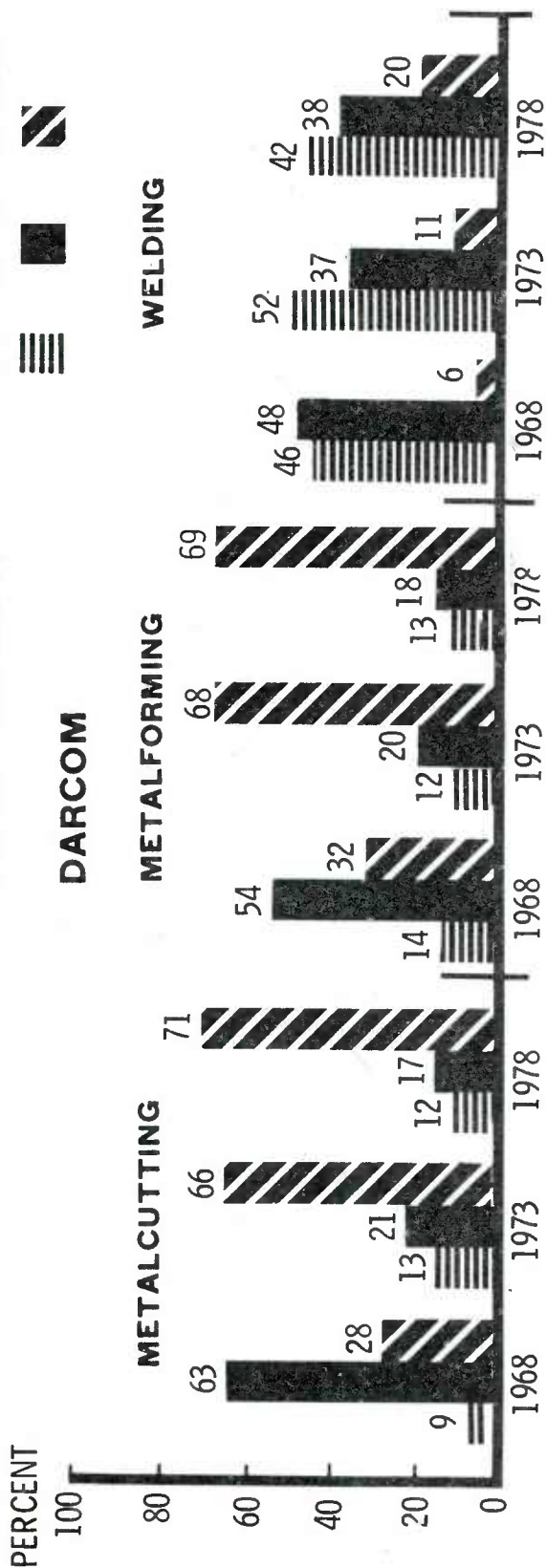


FIGURE 11-1

SECTION III

EQUIPMENT STATUS WITHIN DARCOM

This section presents the status of each of the six classes of IPE for the major subordinate commands (SUBMACOM's) and laboratories and centers (LABS & CENTERS) within DARCOM. The age distribution (vintage) and the quantity and percent exceeding useful service life are portrayed for each class.

The service life data were calculated by DIPEC based on the useful service life contained in AR 700-43 for each type of equipment within each class. These detailed service life listings were averaged for each class to facilitate data assembly.

ACTIVE EQUIPMENT

Age Distribution (Vintage). The age distribution for each of the six classes of equipment is shown in the following figures:

<u>Federal Supply Class (FSC)</u>	<u>Figure</u>	<u>Page</u>
METALCUTTING	III-1	3-3
WELDING	III-2	3-4
METALFORMING	III-3	3-5
HEAT TREAT AND FURNACES	III-4	3-6
ELECTRICAL TESTING AND MEASURING	III-5	3-7
MECHANICAL TESTING AND MEASURING	III-6	3-8

The age distribution of active DARCOM equipment is influenced greatly by the class of the equipment.

Metalcutting and metalforming equipment are the oldest, most of it over 20 years old. This is true regardless of which command owns it.

Welding equipment, because of its shorter life, is newer with most of the equipment less than 20 years old.

Heat treating equipment and furnaces are essentially evenly distributed with respect to age. ARRCOM and TECOM are notable exceptions with much of their equipment over 20 years old.

Electrical testing and measuring equipment is the newest within DARCOM with much of it less than 10 years old. It is used extensively by TECOM, MICOM, DESCOM, ARRADCOM, CECOM, and ERADCOM.

Mechanical testing and measuring equipment is generally less than 20 years old. ARRCOM, with 1,507 items, is by far the greatest user of this class of equipment.

Useful Service Life. The quantity and percent of each of the six classes of equipment that exceed useful service life are shown in the following figures:

<u>Federal Supply Class (FSC)</u>	<u>Figure</u>	<u>Page</u>
METALCUTTING	III-7	3-9
WELDING	III-8	3-10
METALFORMING	III-9	3-11
HEAT TREAT AND FURNACES	III-10	3-12
ELECTRICAL TESTING AND MEASURING	III-11	3-13
MECHANICAL TESTING AND MEASURING	III-12	3-14

The percent of metalcutting equipment that exceeds useful service life varies from 37 percent, or 66 items, being used by ERADCOM to 88 percent, or 1,314 items, controlled by TACOM. However, ARRCOM has the most equipment, 5,652 items or 64 percent, that exceed useful service life.

Welding equipment which exceeds useful service life varies from 15 percent, or six items, belonging to ERADCOM to 50 percent, or five items controlled by NARADCOM and 40 items controlled by MICOM. DESCOM and ARRCOM have the most items exceeding useful service life, 217 and 150 items respectively.

AVRADCOM has the highest percent of metalforming equipment which exceeds useful service life with 83 percent, or 40 items. LABS & CENTERS have the lowest percent with 22 percent, or 22 items. ARRCOM has the greatest quantity, 1,644 items, exceeding useful service life which is 68 percent of their items.

ARRCOM has 393 items classified as heat treating equipment and furnaces that exceed useful service life, more than any other command within DARCOM. ERADCOM, with six percent, or three items, has the lowest percent exceeding useful service life. AVRADCOM with 90 percent, or 19 items, has the highest percent exceeding useful service life.

The percent of electrical testing and measuring equipment that exceeds useful service life varies from 26 percent, or 166 items, for MERADCOM to 77 percent, or 1,736 items for CECOM. This class of equipment is widely used within DARCOM. TECOM has the most equipment in this class that exceeds useful service life with 3,215 items, or 48 percent; followed by DESCOM with 1,904 items, or 48 percent; and CECOM with 1,736 items or 77 percent.

The 631 items, or 42 percent, of ARRCOM's mechanical testing and measuring equipment, which exceed useful service life are the most for a command within DARCOM. The percent exceeding useful service life for this class varies from 10 percent, or six items, for ERADCOM to 53 percent, or 23 items, for AVRADCOM.

ACTIVE EQUIPMENT VINTAGE METAL CUTTING

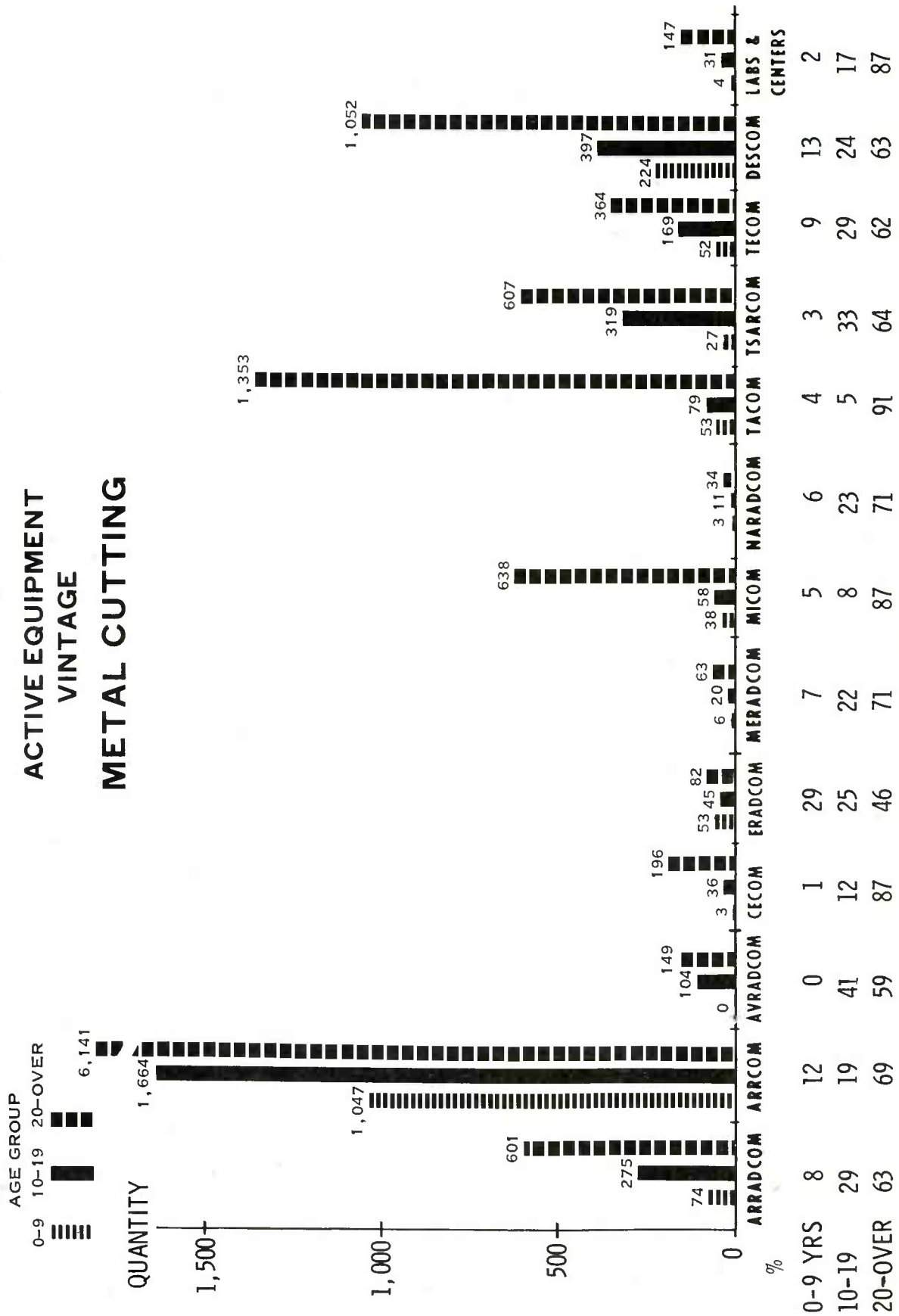


FIGURE III-1

AGE GROUP
0-9 10-19 20-OVER



ACTIVE EQUIPMENT VINTAGE WELDING

QUANTITY

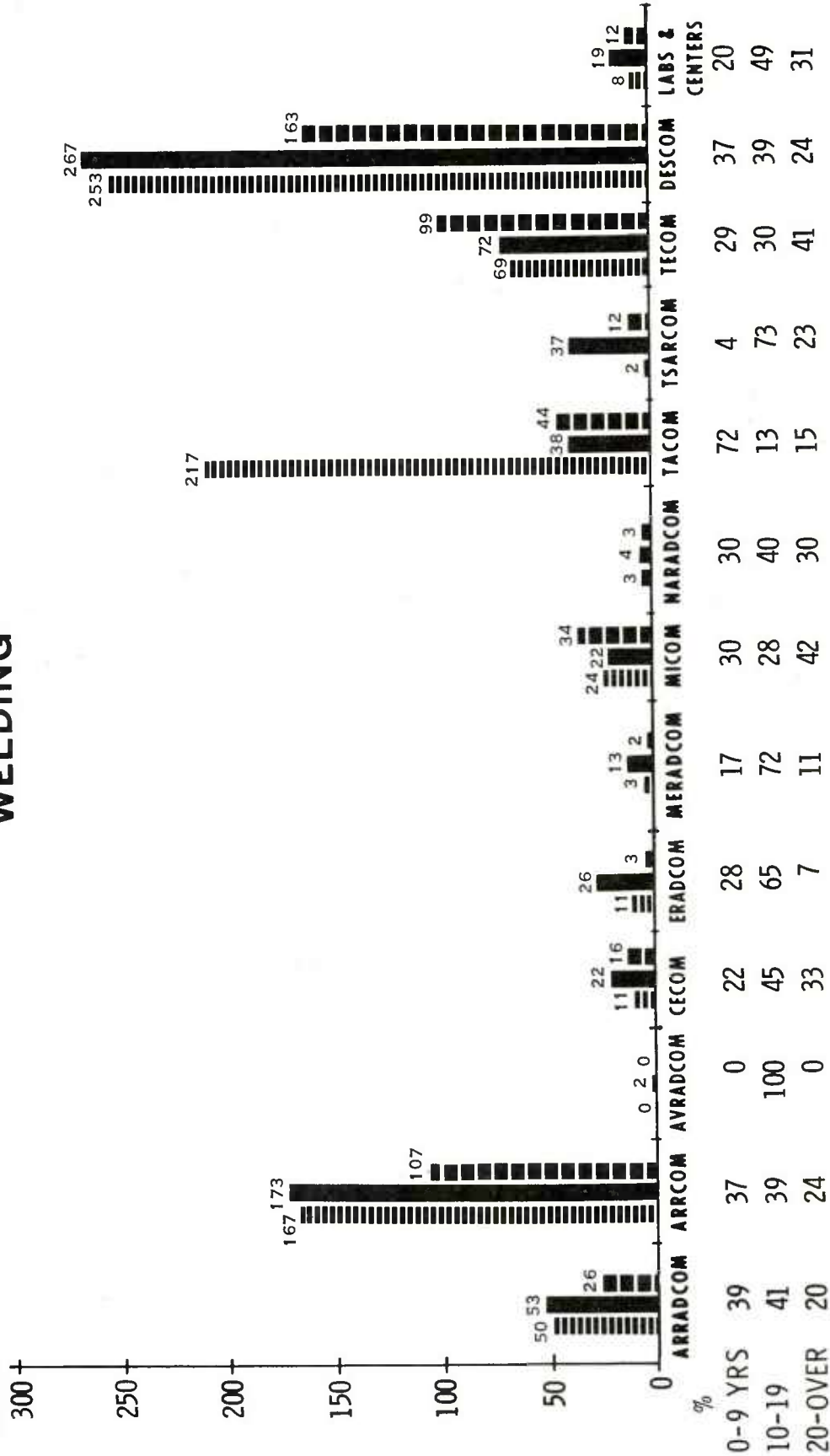


FIGURE III-2

ACTIVE EQUIPMENT VINTAGE METAL FORMING

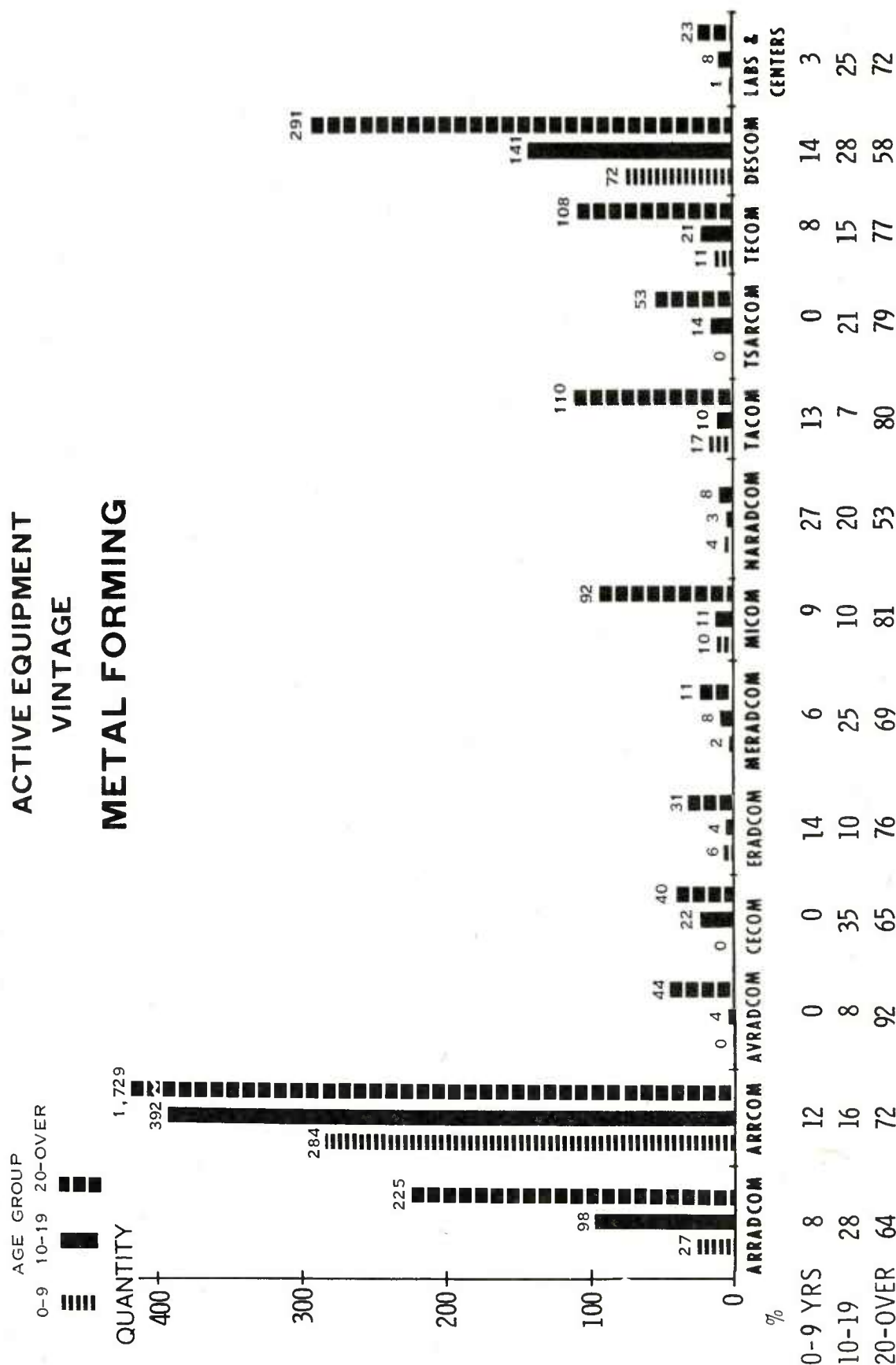
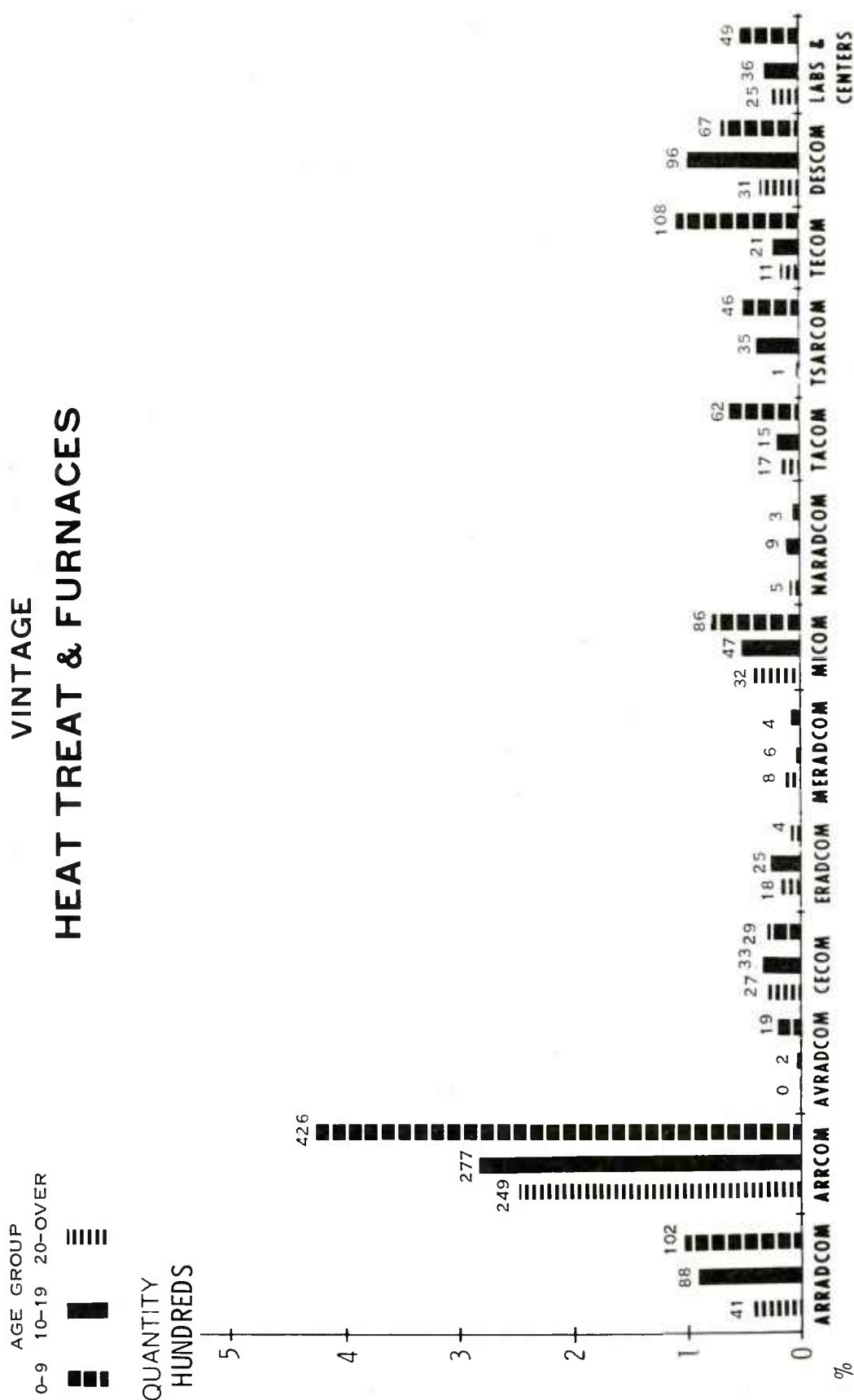


FIGURE III-3

ACTIVE EQUIPMENT VINTAGE HEAT TREAT & FURNACES



1980
1985

0-9 YRS	18	26	0	30	38	45	19	29	18	1	8	16	22
10-19	38	29	10	37	53	33	29	53	16	43	15	49	33
20-OVER	44	45	90	33	8	22	52	18	66	56	77	35	45

FIGURE III-4

ACTIVE EQUIPMENT VINTAGE ELECTRICAL TEST & MEAS

AGE GROUP
0-9 10-19 20-OVER

QUANTITY

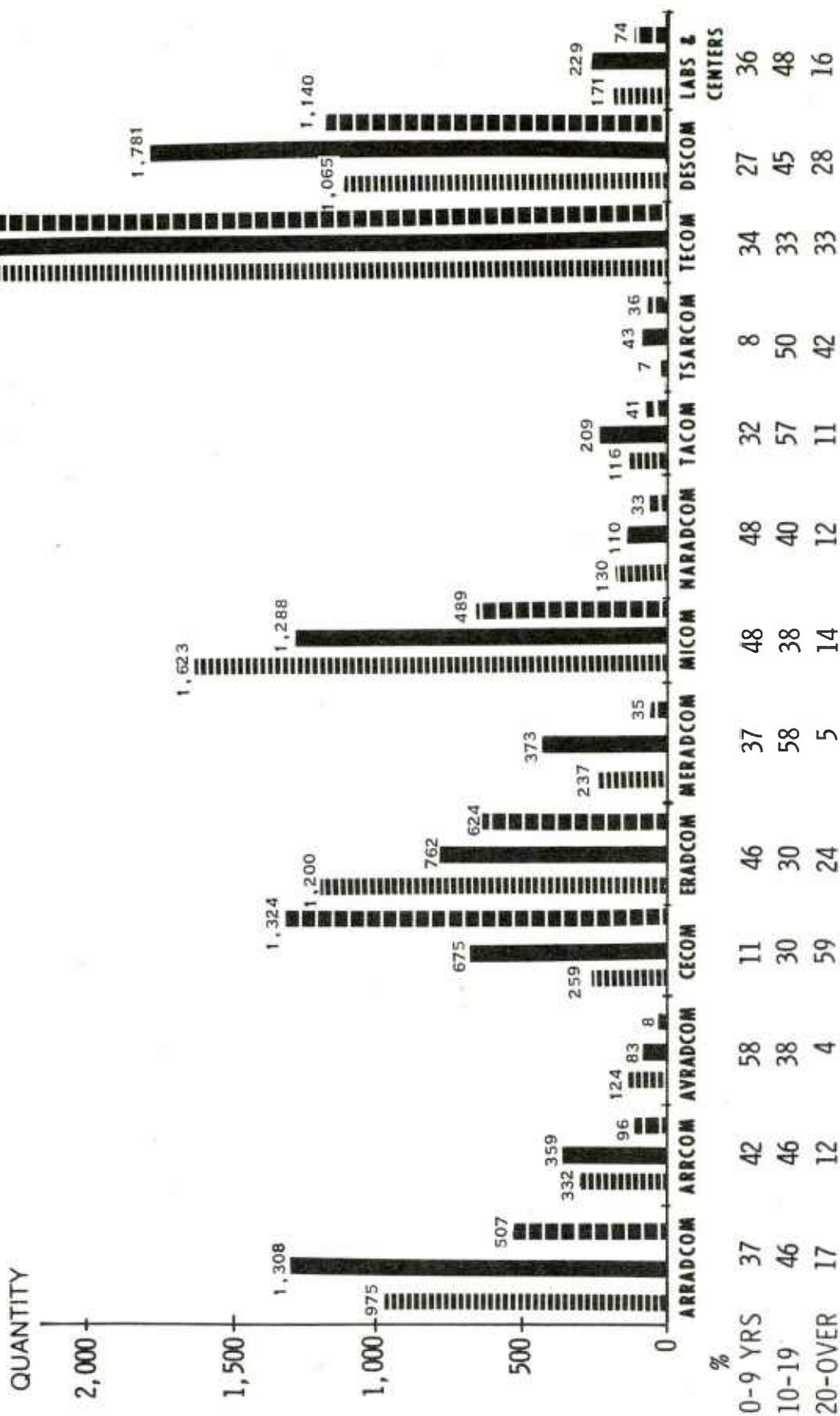


FIGURE III-5

ACTIVE EQUIPMENT VINTAGE MECHANICAL TEST & MEAS

AGE GROUP
0-9 10-19 20-OVER

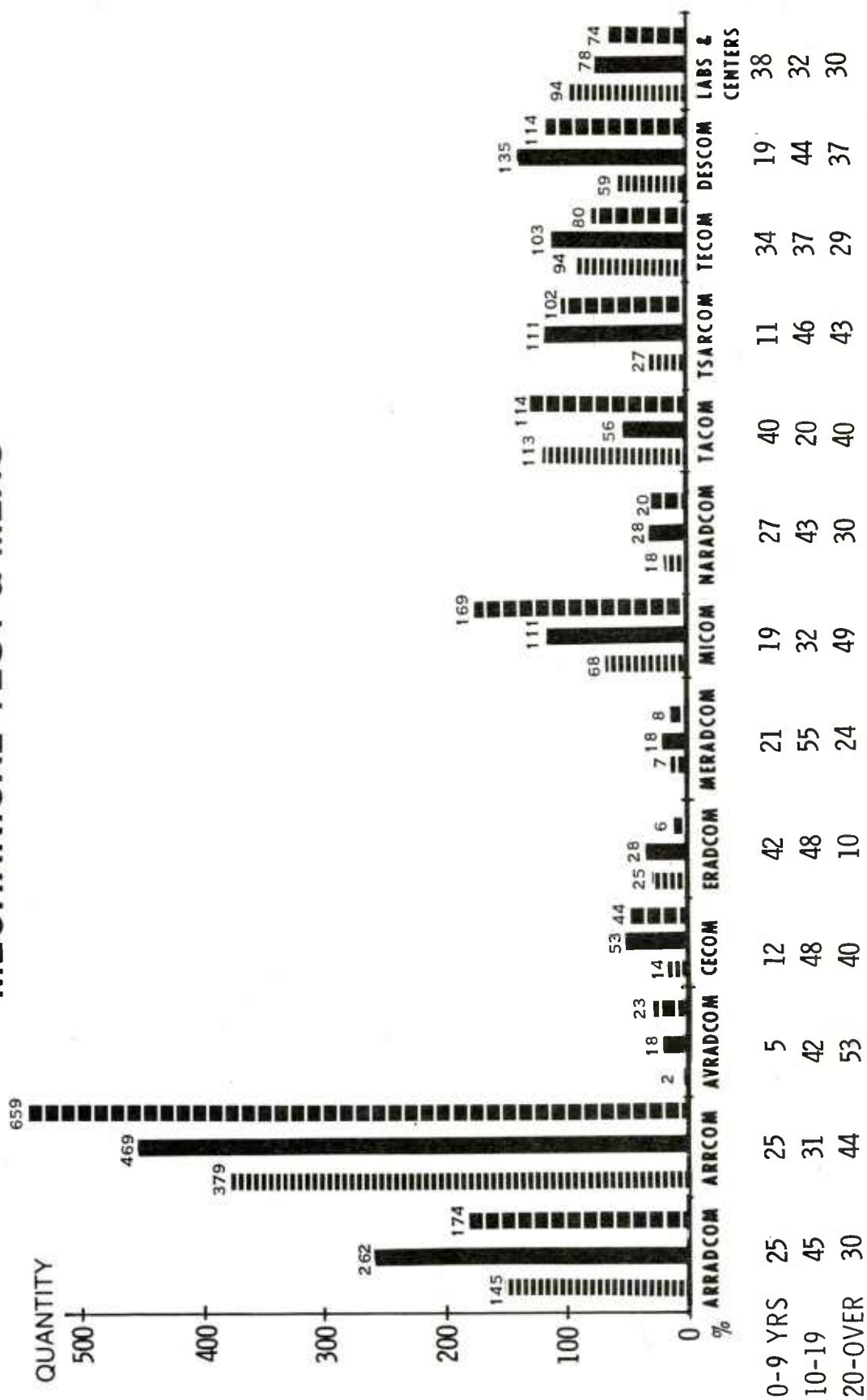


FIGURE III-6

ACTIVE EQUIPMENT

QUANTITY & PERCENT EXCEEDING USEFUL SERVICE LIFE

1981 1986

METAL CUTTING

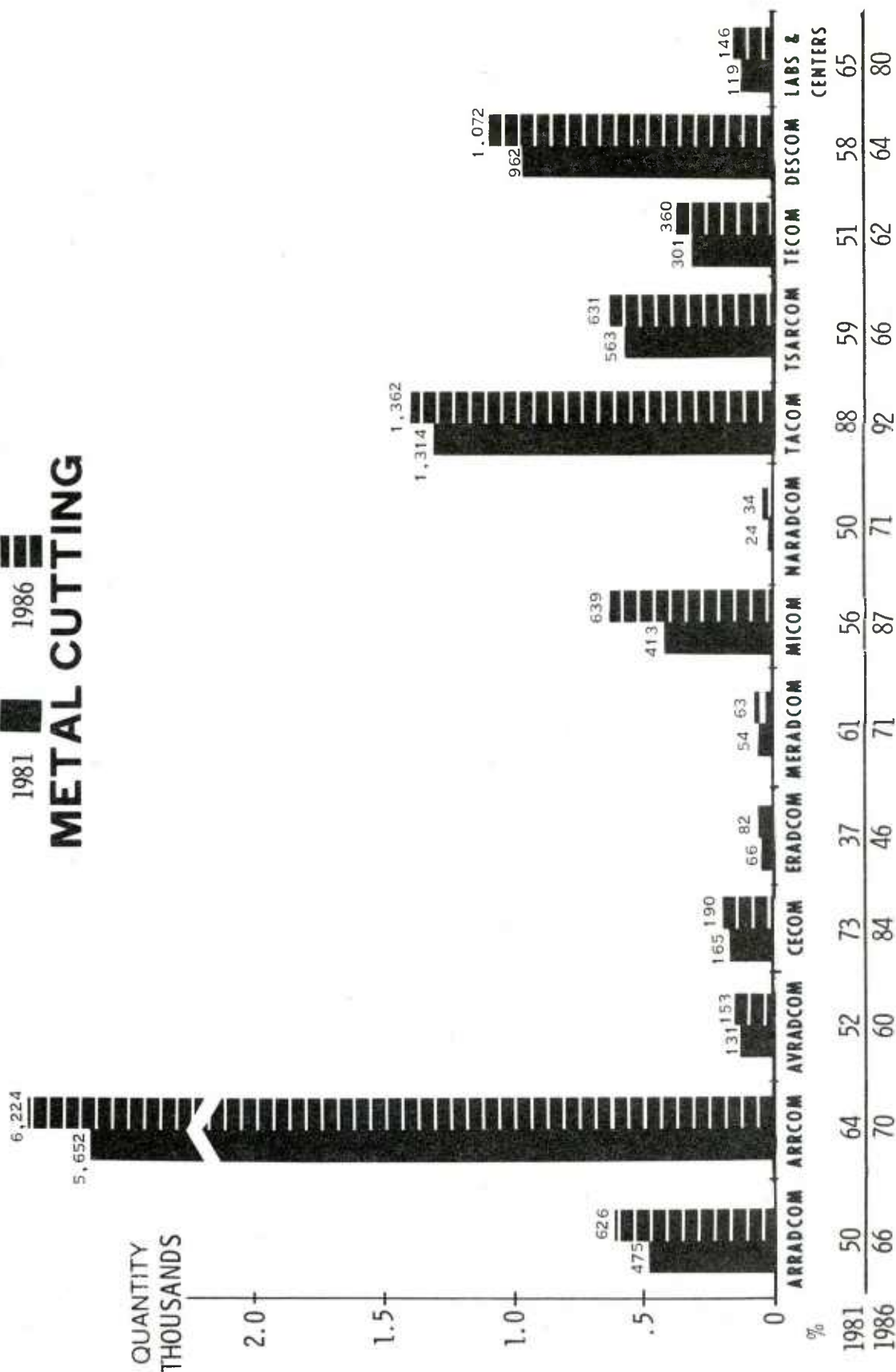


FIGURE III-7

ACTIVE EQUIPMENT
 QUANTITY & PERCENT EXCEEDING USEFUL SERVICE LIFE
 1981 1986
WELDING

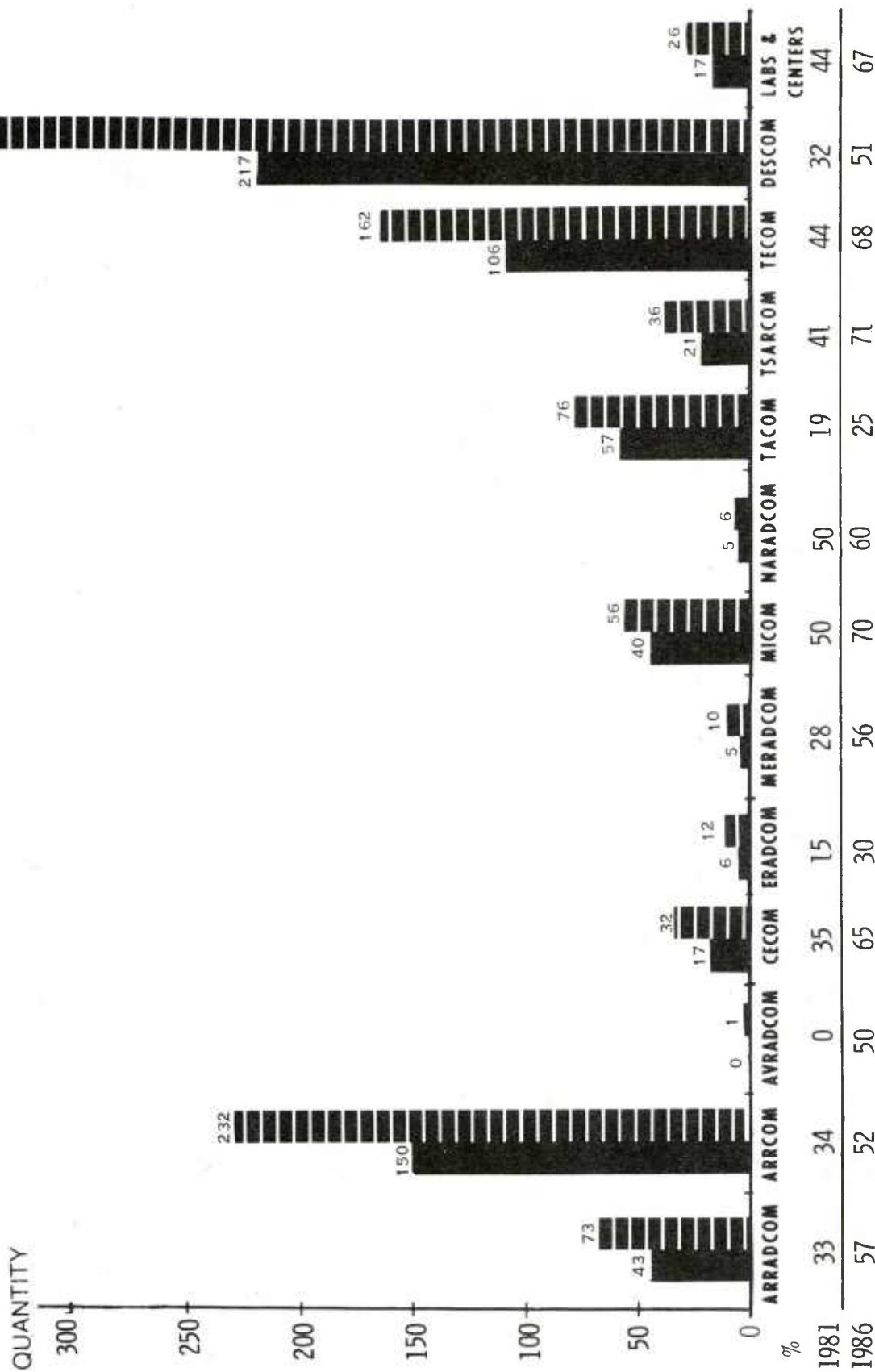


FIGURE III-8

ACTIVE EQUIPMENT
 QUANTITY & PERCENT EXCEEDING USEFUL SERVICE LIFE
 1981 1986

METAL FORMING

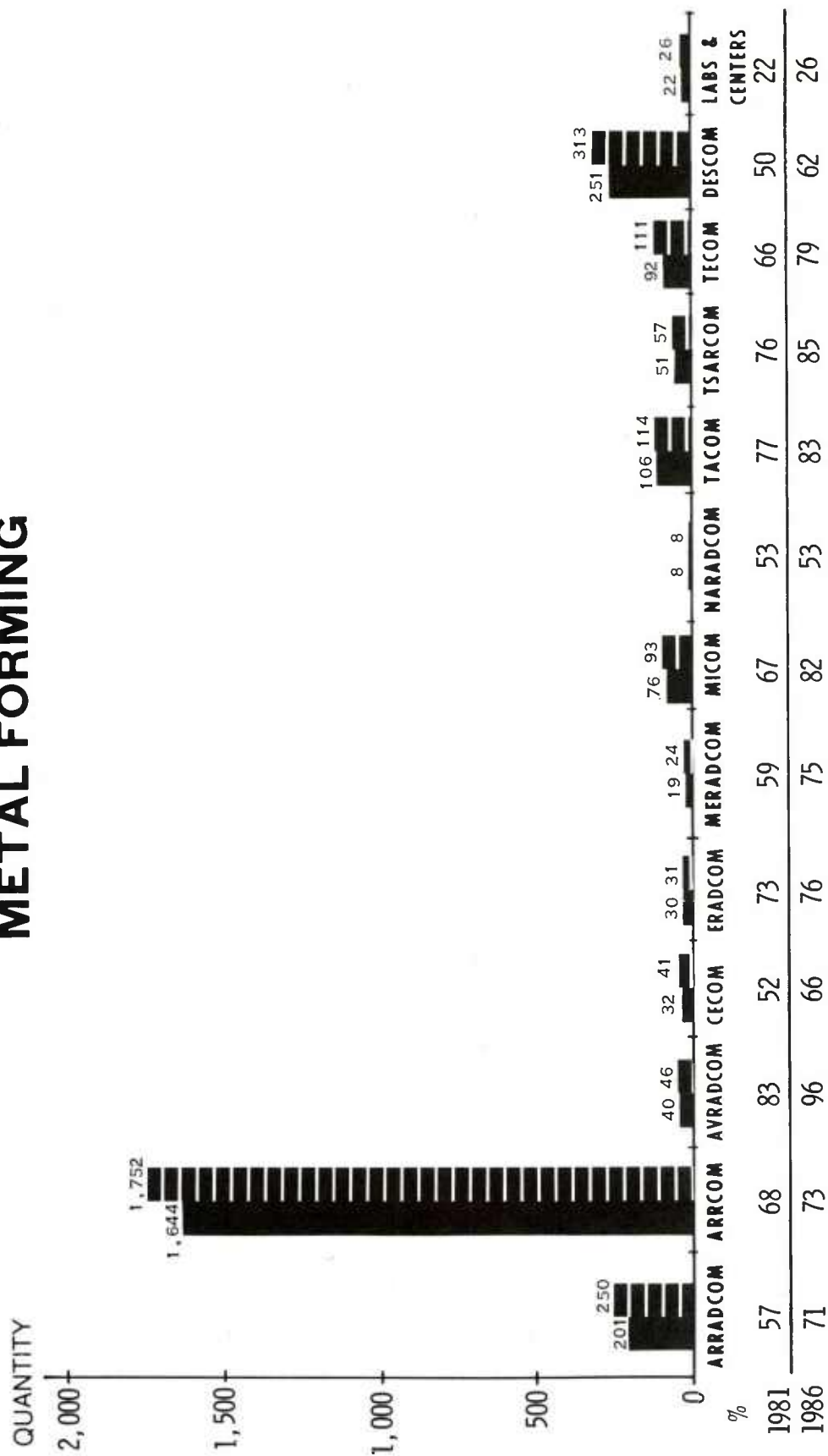


FIGURE III-9

ACTIVE EQUIPMENT

QUANTITY & PERCENT EXCEEDING USEFUL SERVICE LIFE

1981 ■ 1986 ■

HEAT TREAT & FURNACES

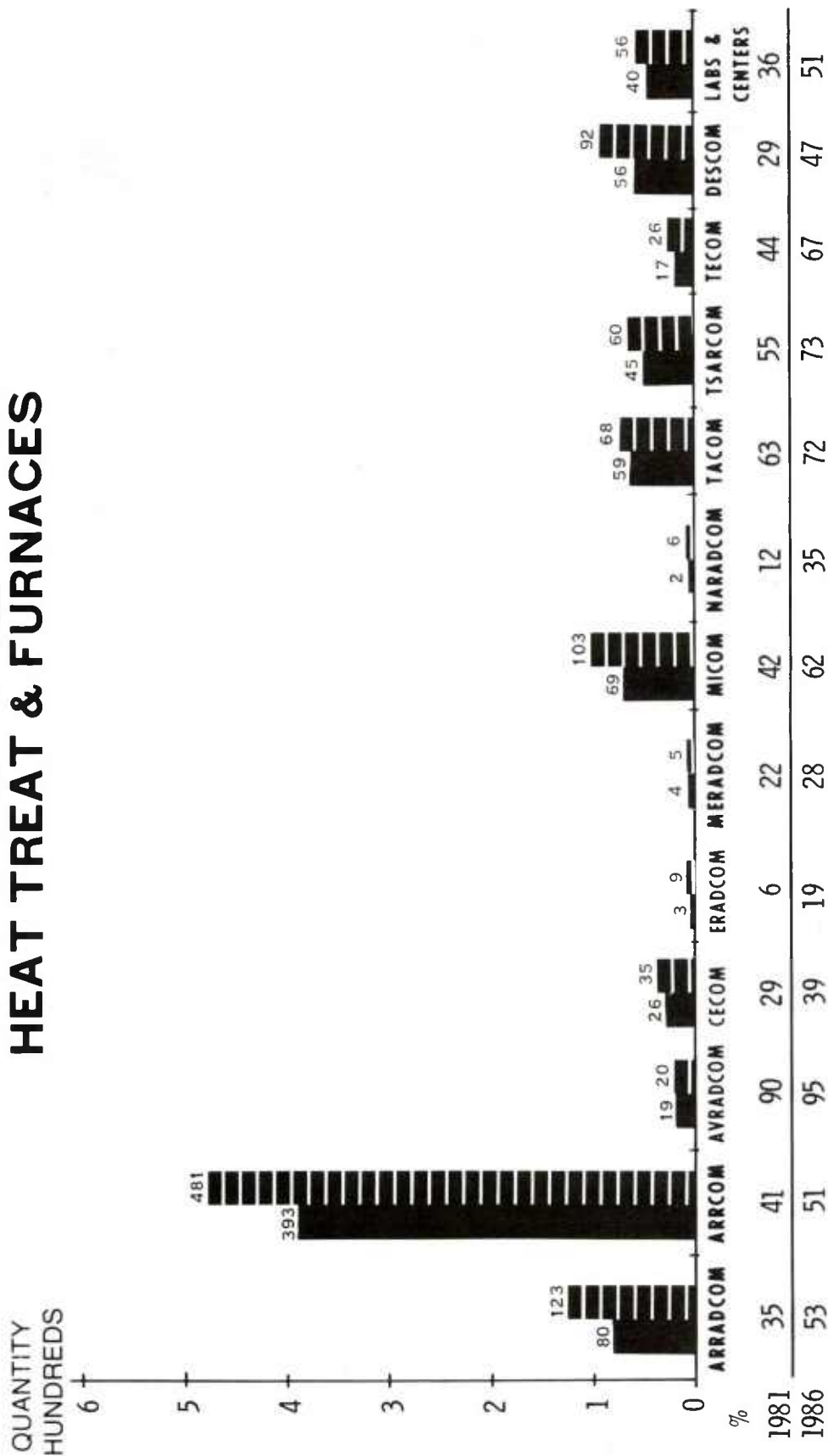


FIGURE III-10

ACTIVE EQUIPMENT
 QUANTITY & PERCENT EXCEEDING USEFUL SERVICE LIFE
 1981 ■ 1986

ELECTRICAL TEST & MEASURE

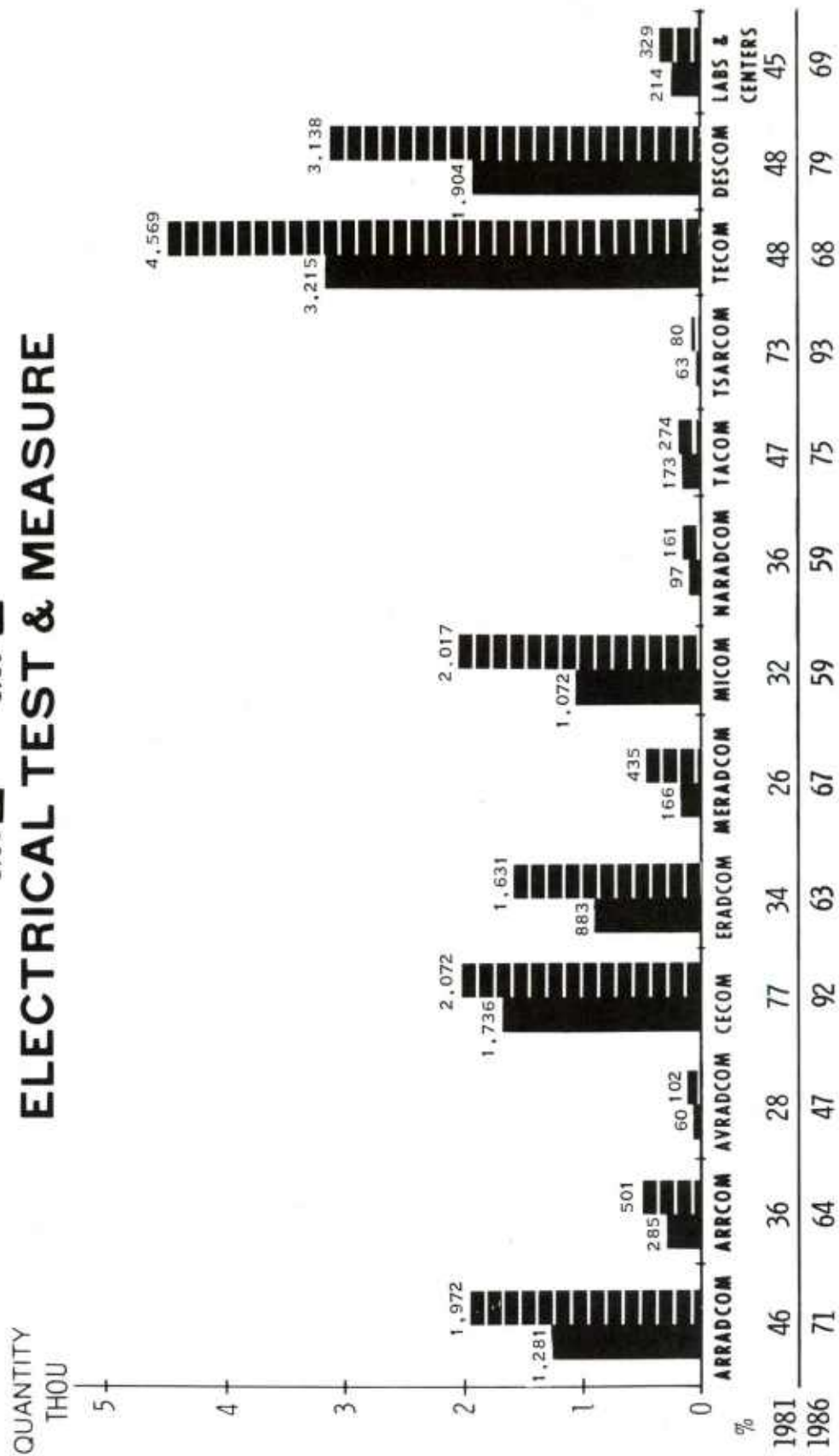


FIGURE III-11

ACTIVE EQUIPMENT QUANTITY & PERCENT EXCEEDING USEFUL SERVICE LIFE 1981 ■ 1986 ■ MECHANICAL TEST & MEASURE

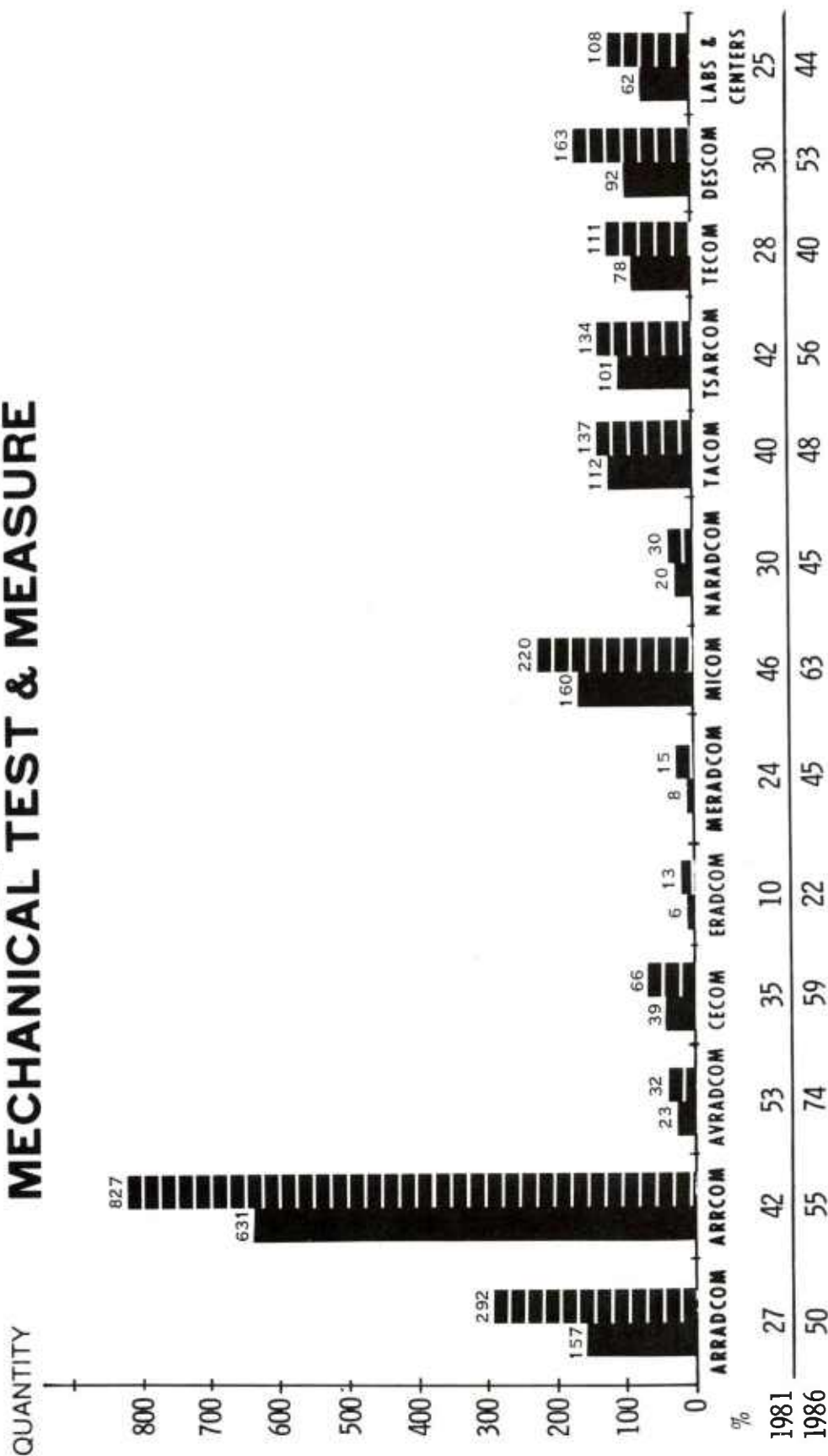


FIGURE III-12

INACTIVE EQUIPMENT

Age Distribution (Vintage). The age distribution for each of the six classes of equipment is shown in the following figures:

<u>Federal Supply Class (FSC)</u>	<u>Figure</u>	<u>Page</u>
METALCUTTING	III-13	3-17
WELDING	III-14	3-18
METALFORMING	III-15	3-19
HEAT TREAT AND FURNACES	III-16	3-20
ELECTRICAL TESTING AND MEASURING	III-17	3-21
MECHANICAL TESTING AND MEASURING	III-18	3-22

As might be expected, the inactive equipment being retained by DARCOM in plant equipment packages (PEP's) has a much older age profile than active equipment.

The bulk of the metalcutting equipment is over 20 years old, varying from zero percent for AVRADCOM to 100 percent for ARRADCOM and CECOM. However, ARRCOM controls much more of this equipment with TACOM a distant second. Significantly, 88 percent of ARRCOM's 10,357 items and 99 percent of TACOM's 1,951 items are over 20 years old.

Only three commands have welding equipment in storage. ARRCOM has the most equipment, 235 items. TACOM is second with 155 items. Forty-eighty percent of ARRCOM's items and 36 percent of TACOM's items are over 20 years old.

Metalforming equipment is predominantly over 20 years old. Eighty-seven percent of ARRCOM's items and 100 percent of TACOM's, TSARCOM's, and CECOM's items are over 20 years old. ARRCOM controls the bulk of this inactive equipment, 3,414 items, followed by TACOM with 37 items.

Only three commands, ARRCOM, TACOM, and TSARCOM have heat treating equipment and furnaces in storage. ARRCOM has by far the most equipment, 644 items, or 68 percent over 20 years old. However, 95 percent of TACOM's 73 items are over 20 years old.

ARRCOM and CECOM are the only commands that have electrical testing and measuring equipment in storage. Most of ARRCOM's items are more than 10 years old. All of CECOM's 14 items are more than 10 years old.

ARRCOM has the bulk of the mechanical testing and measuring equipment that is being retained. The major portion of that equipment, 53 percent of the 751 items, is over 20 years old. Ninety-nine percent, or 149 items, of TACOM's equipment is over 20 years old.

Useful Service Life. The quantity and percent of each of the six classes of equipment that exceed useful service life are shown in the following figures:

<u>Federal Supply Class (FSC)</u>	<u>Figure</u>	<u>Page</u>
METALCUTTING	III-19	3-23
WELDING	III-20	3-24
METALFORMING	III-21	3-25
HEAT TREAT AND FURNACES	III-22	3-26
ELECTRICAL TESTING AND MEASURING	III-23	3-27
MECHANICAL TESTING AND MEASURING	III-24	3-28

Useful service life is primarily dependent on use which is not directly related to the age of inactive equipment. Therefore, a comparison of equipment age to useful service life for inactive equipment is of limited value.

ARRCOM and TACOM have almost all of the inactive equipment that exceeds useful service life. The quantity and percent exceeding useful service life for these commands is summarized below:

<u>Federal Supply Class (FSC)</u>	<u>ARRCOM</u>		<u>TACOM</u>	
	<u>QUANTITY</u>	<u>PERCENT</u>	<u>QUANTITY</u>	<u>PERCENT</u>
METALCUTTING	8,625	83	1,889	97
WELDING	122	52	56	36
METALFORMING	2,912	85	37	100
HEAT TREAT AND FURNACES	621	65	69	95
ELECTRICAL TESTING AND MEASURING	102	58	0	0
MECHANICAL TESTING AND MEASURING	389	52	98	98
TOTAL	12,771		2,149	

A greater percentage of the equipment controlled by TACOM exceeds useful service life than that being retained by ARRCOM. However, ARRCOM has almost six times as much inactive equipment that exceeds its useful service life.

The other SUBMACOM's have only small amounts of equipment that exceed useful service life compared to ARRCOM and TACOM. The only exception is electrical testing and measuring equipment where CECOM has more equipment that exceeds useful service life than TACOM but not ARRCOM.

INACTIVE EQUIPMENT VINTAGE METAL CUTTING

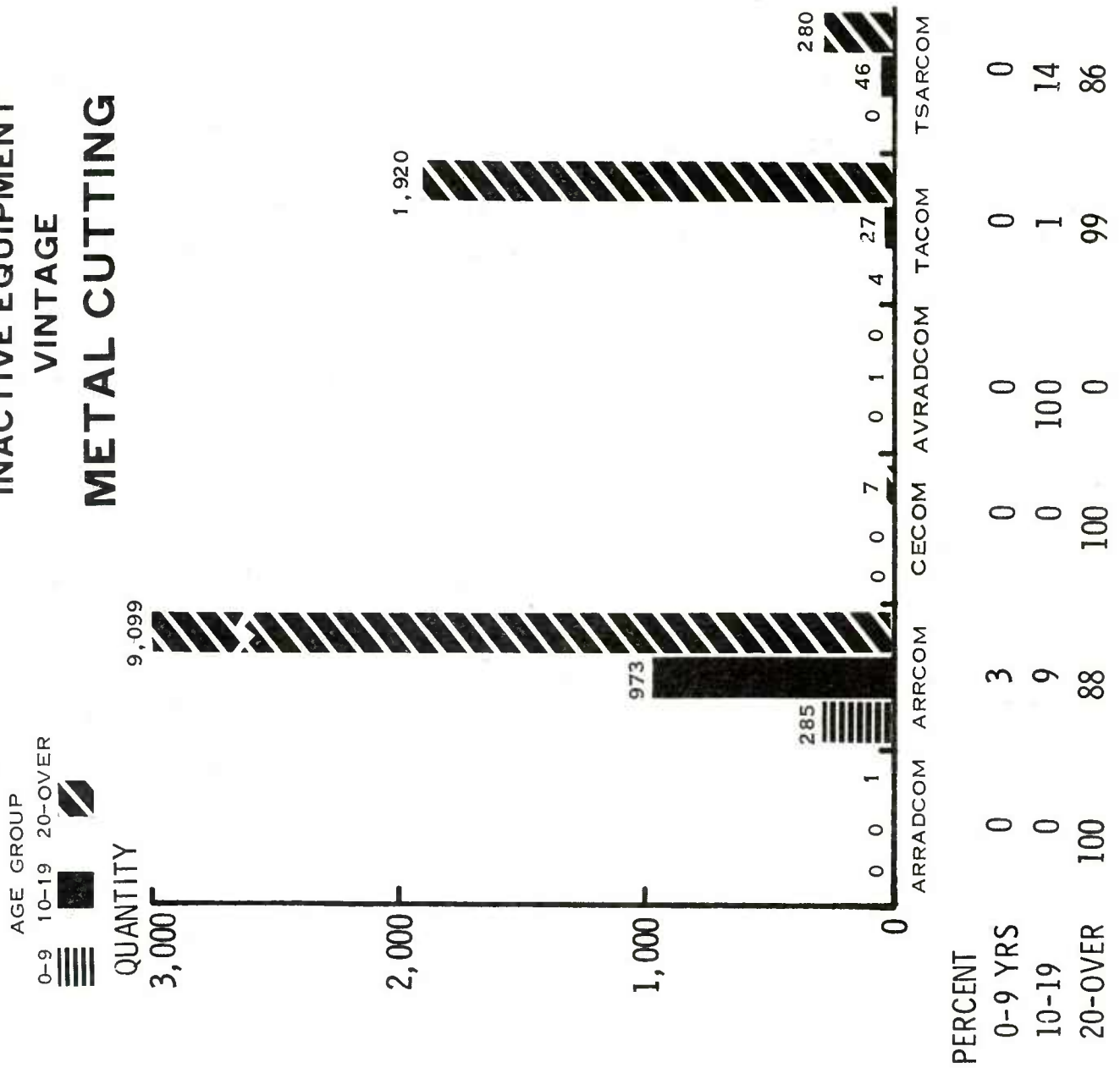
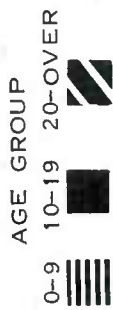


FIGURE III-13

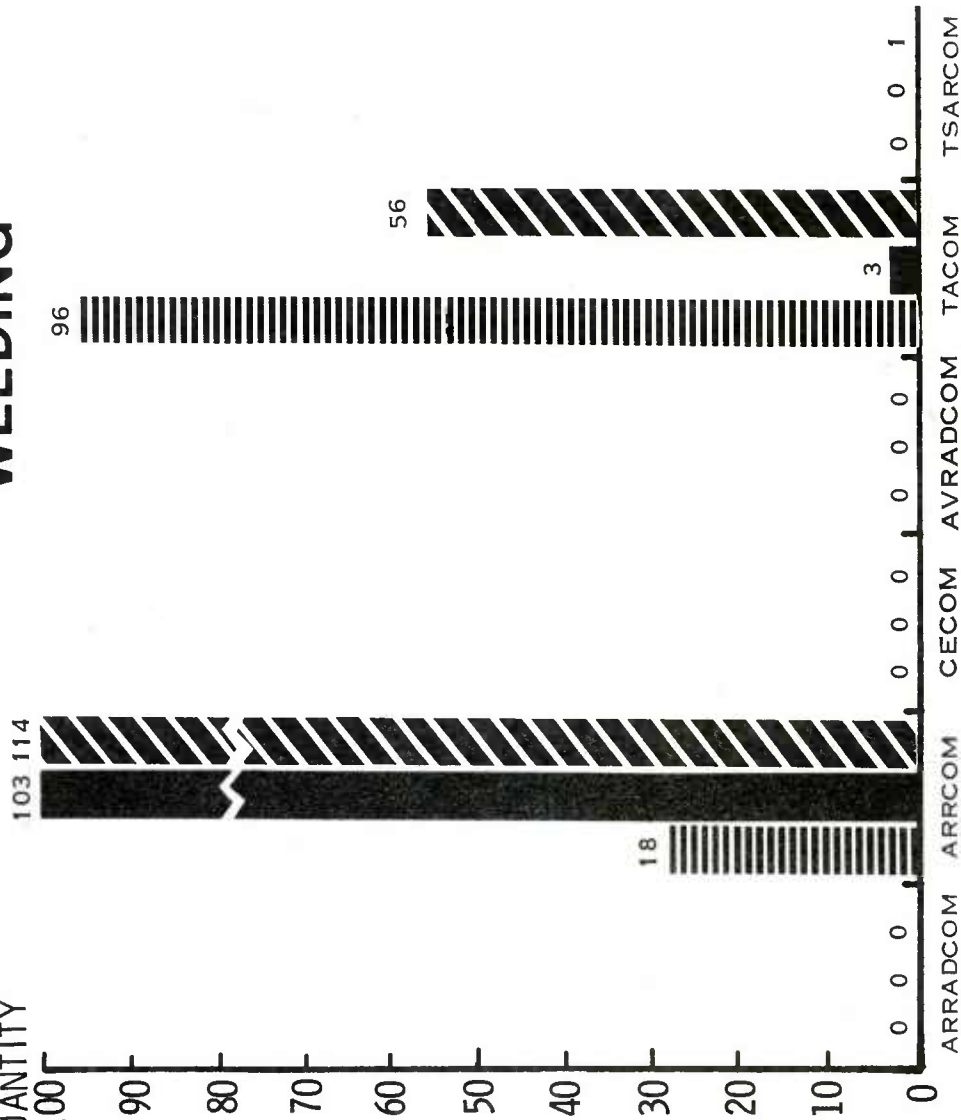
INACTIVE EQUIPMENT

VINTAGE

WELDING



QUANTITY



PERCENT

0-9 YRS	0	8	0	0	62	0
10-19	0	44	0	0	2	0
20-OVER	0	48	0	0	36	100

FIGURE III-14

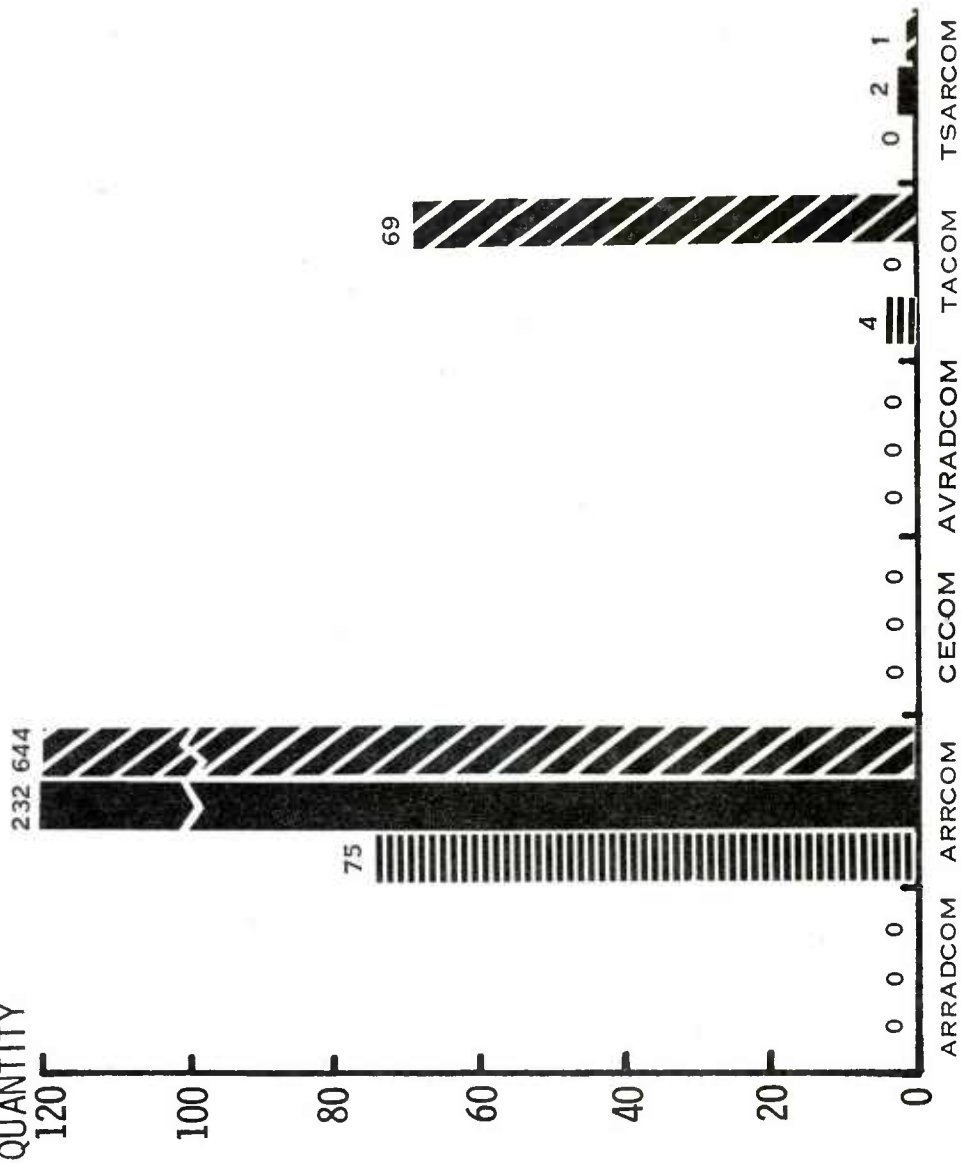
METAL FORMING



INACTIVE EQUIPMENT VINTAGE HEAT TREAT & FURNACES

AGE GROUP
0-9 10-19 20-OVER

QUANTITY



PERCENT

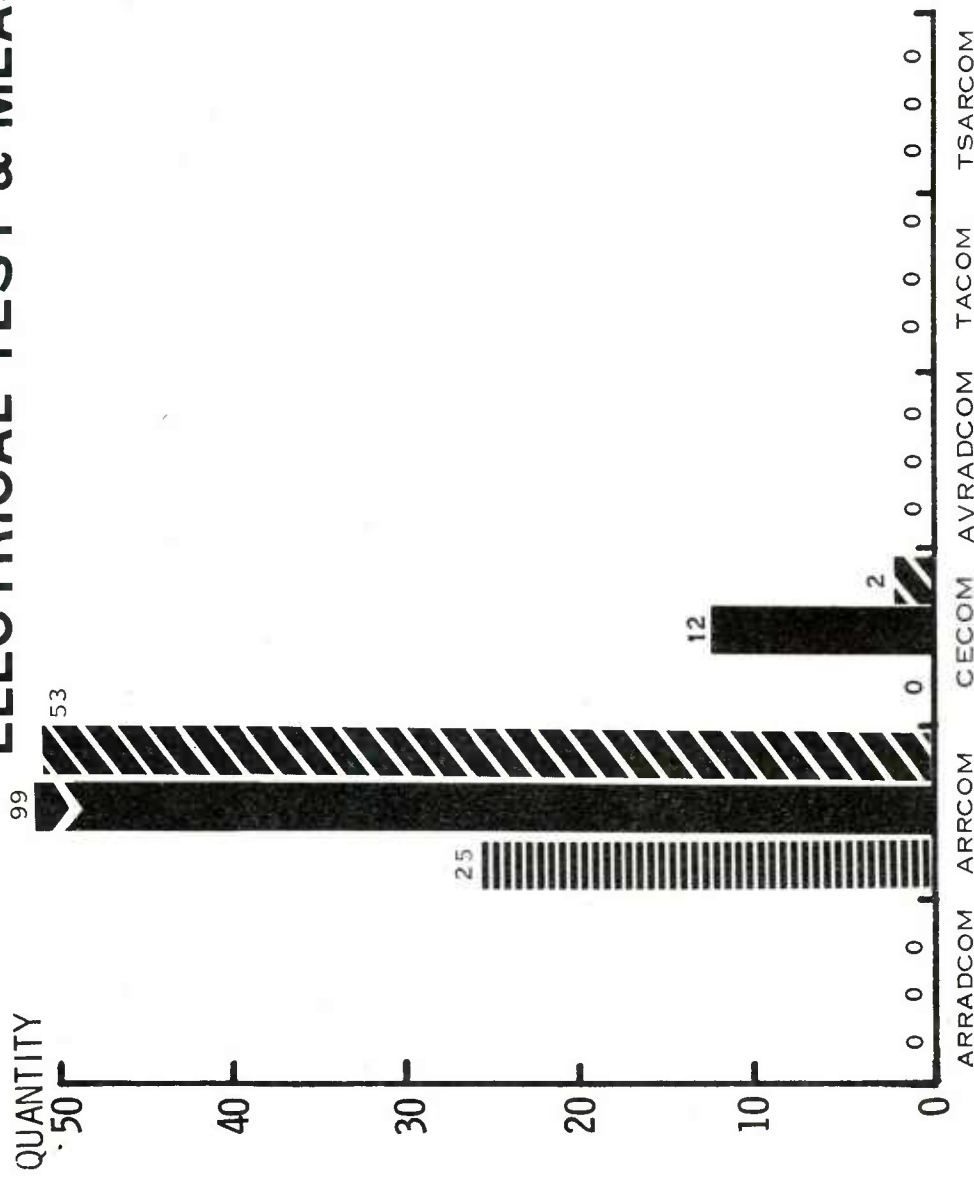
0-9 YRS	0	8	0	0	5	0
10-19	0	24	0	0	0	67
20-OVER	0	68	0	0	95	33

FIGURE III-16

INACTIVE EQUIPMENT VINTAGE ELECTRICAL TEST & MEAS

AGE GROUP
0-9 10-19 20-OVER

QUANTITY

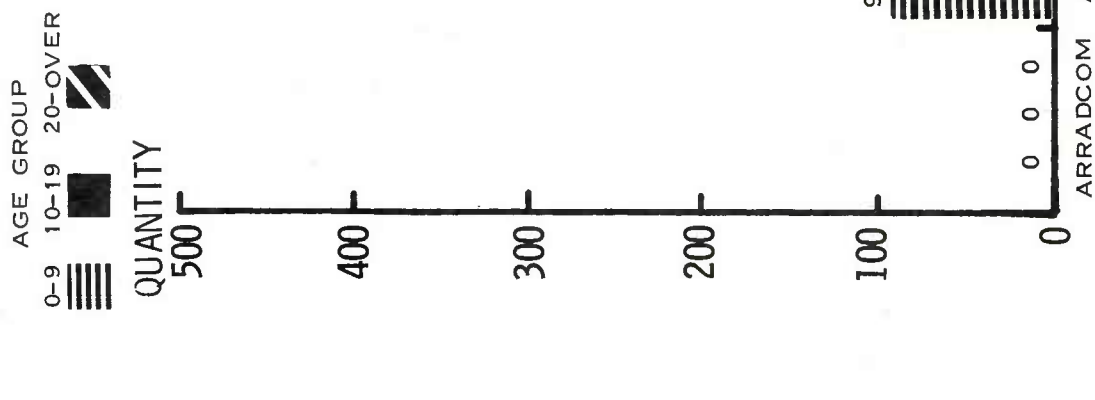


PERCENT

0-9 YRS	0	14	0	0	0	0
10-19	0	56	86	0	0	0
20-OVER	0	30	14	0	0	0

FIGURE III-17

INACTIVE EQUIPMENT VINTAGE MECHANICAL TEST & MEAS



PERCENT	0-9 YRS	10-19	20-OVER
ARRADCOM	0	0	0
ARRCOM	12	35	53
CERCOM	0	0	0
MICOM	0	0	0
TACOM	1	0	99
TSARCOM	0	0	100

FIGURE III-18

INACTIVE EQUIPMENT

QUANTITY & PERCENT EXCEEDING USEFUL SERVICE LIFE

1981 1986

METAL CUTTING

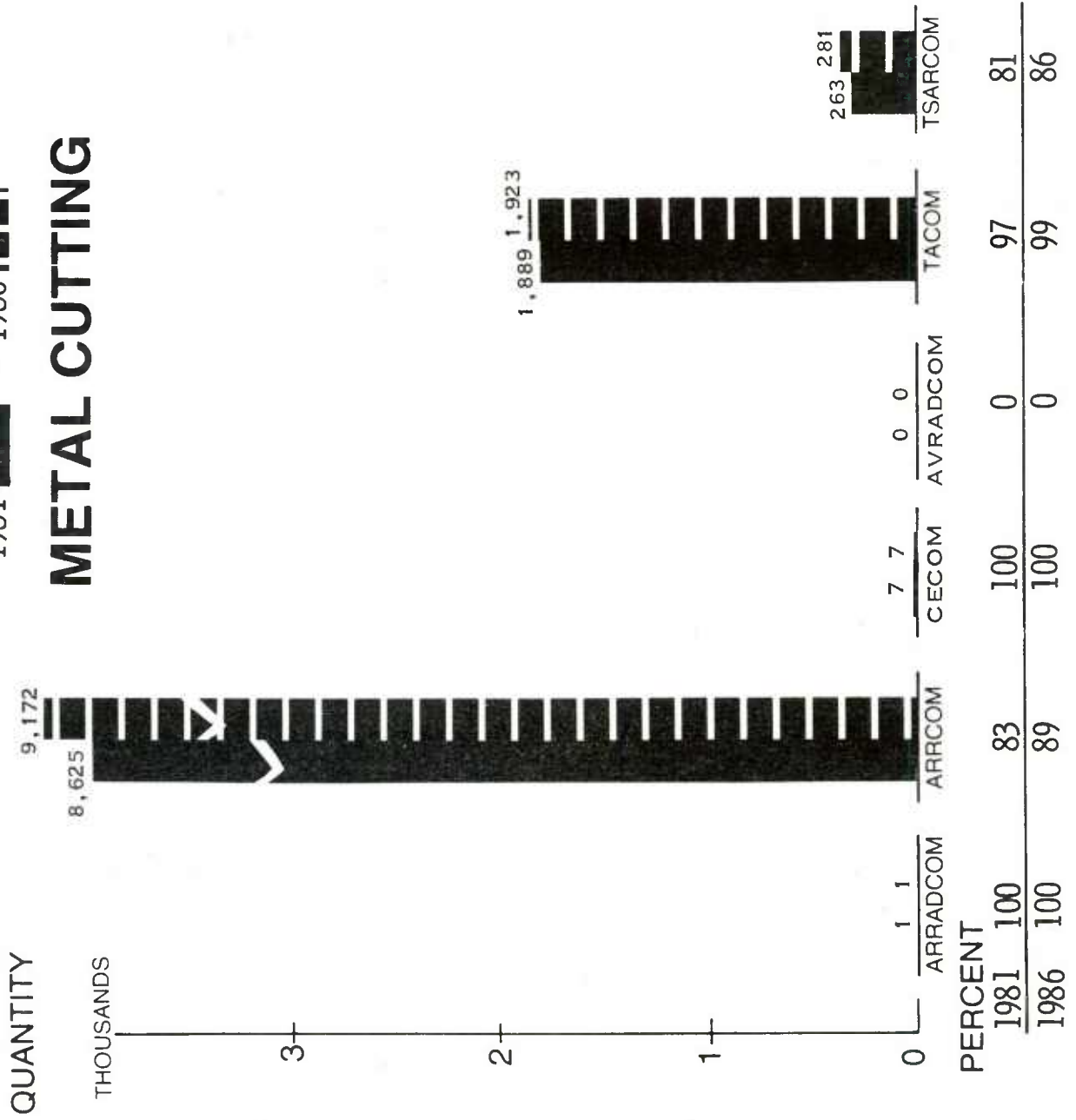


FIGURE III-19



PERCENT							
1981	1986	ARRADCOM	ARRCOM	CECOM	AVRADCOM	TACOM	TSARCOM
0	0	0	52	0	0	36	100
0	79	0	0	0	0	37	100

FIGURE III-20

INACTIVE EQUIPMENT QUANTITY & PERCENT EXCEEDING USEFUL SERVICE LIFE

1981 ■ 1986 ■

METAL FORMING

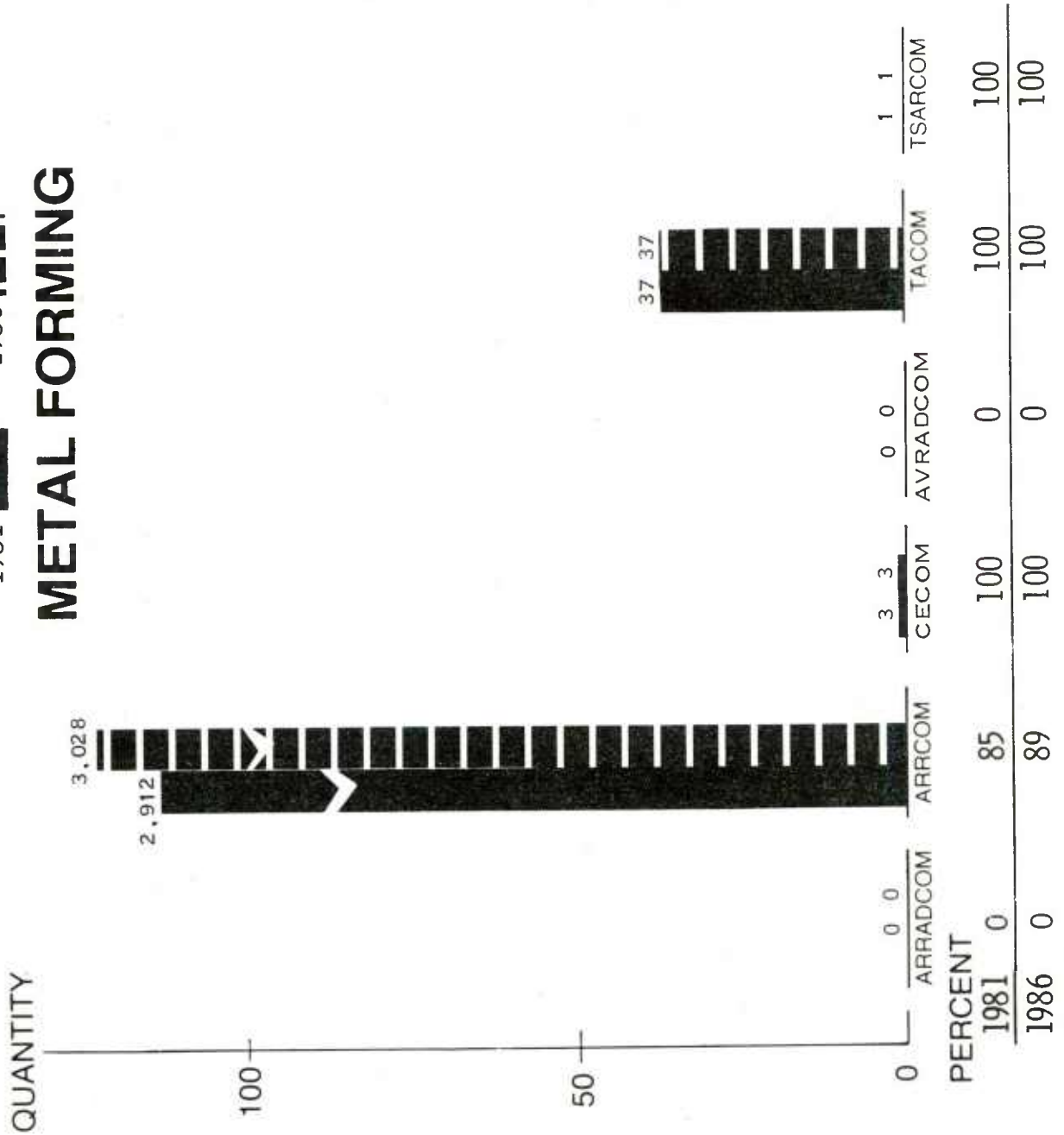


FIGURE III-21

INACTIVE EQUIPMENT

QUANTITY & PERCENT EXCEEDING USEFUL SERVICE LIFE

1981 1986

HEAT TREAT & FURNACES

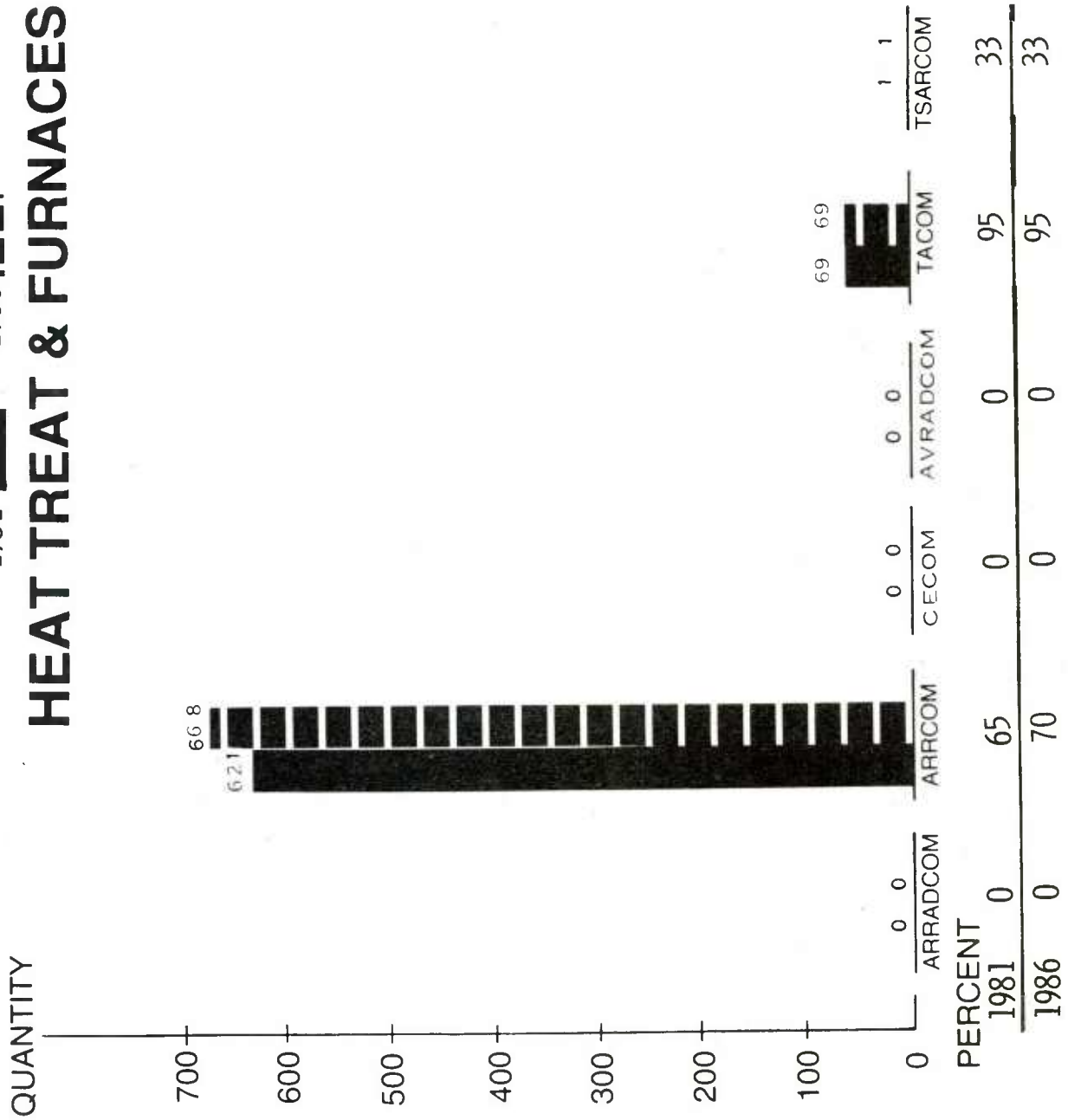


FIGURE III-22

INACTIVE EQUIPMENT

QUANTITY & PERCENT EXCEEDING USEFUL SERVICE LIFE

1981 1986

ELECTRICAL TEST & MEASURE

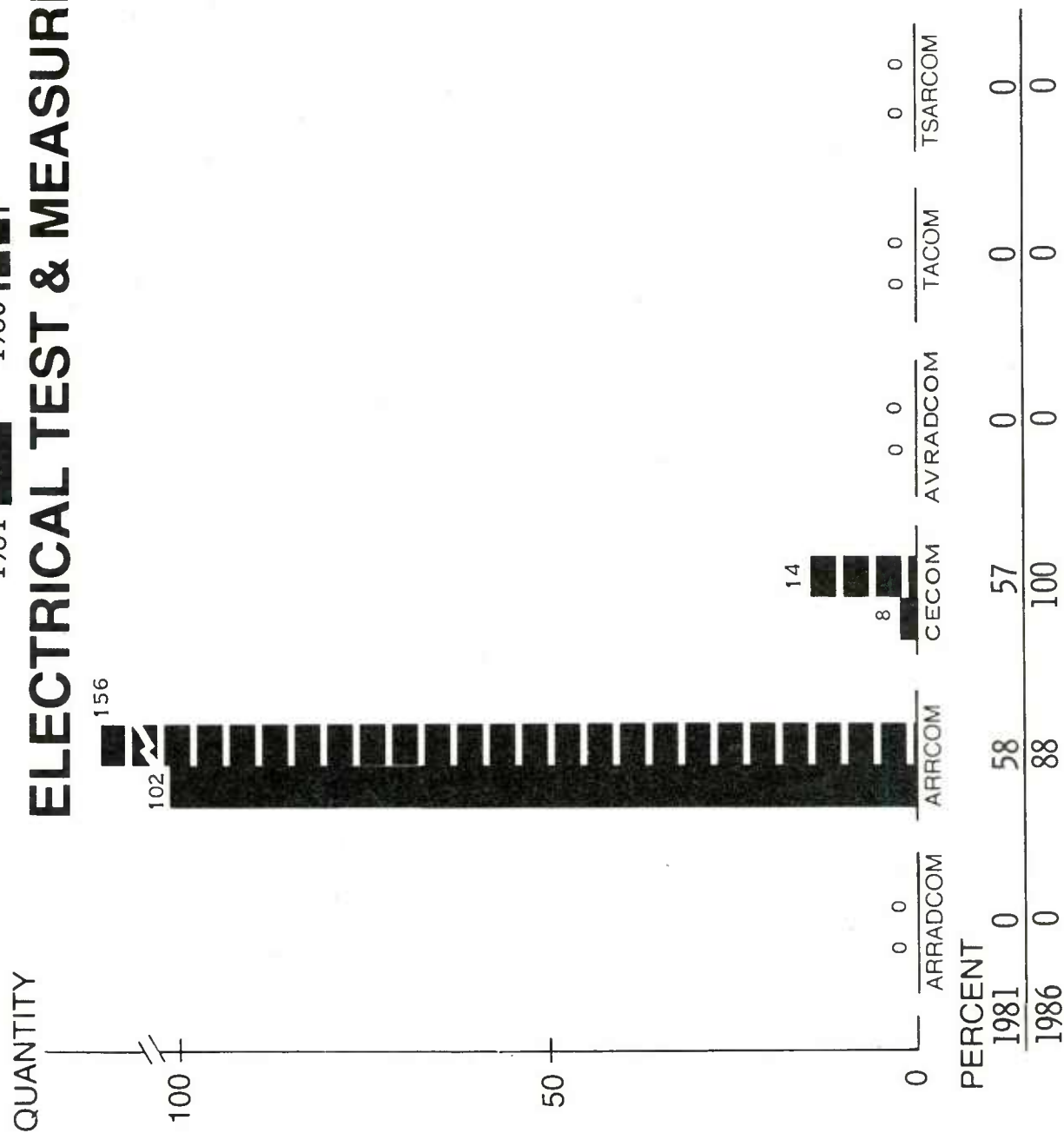


FIGURE III-23

INACTIVE EQUIPMENT

QUANTITY & PERCENT EXCEEDING USEFUL SERVICE LIFE

MECHANICAL TEST & MEASURE

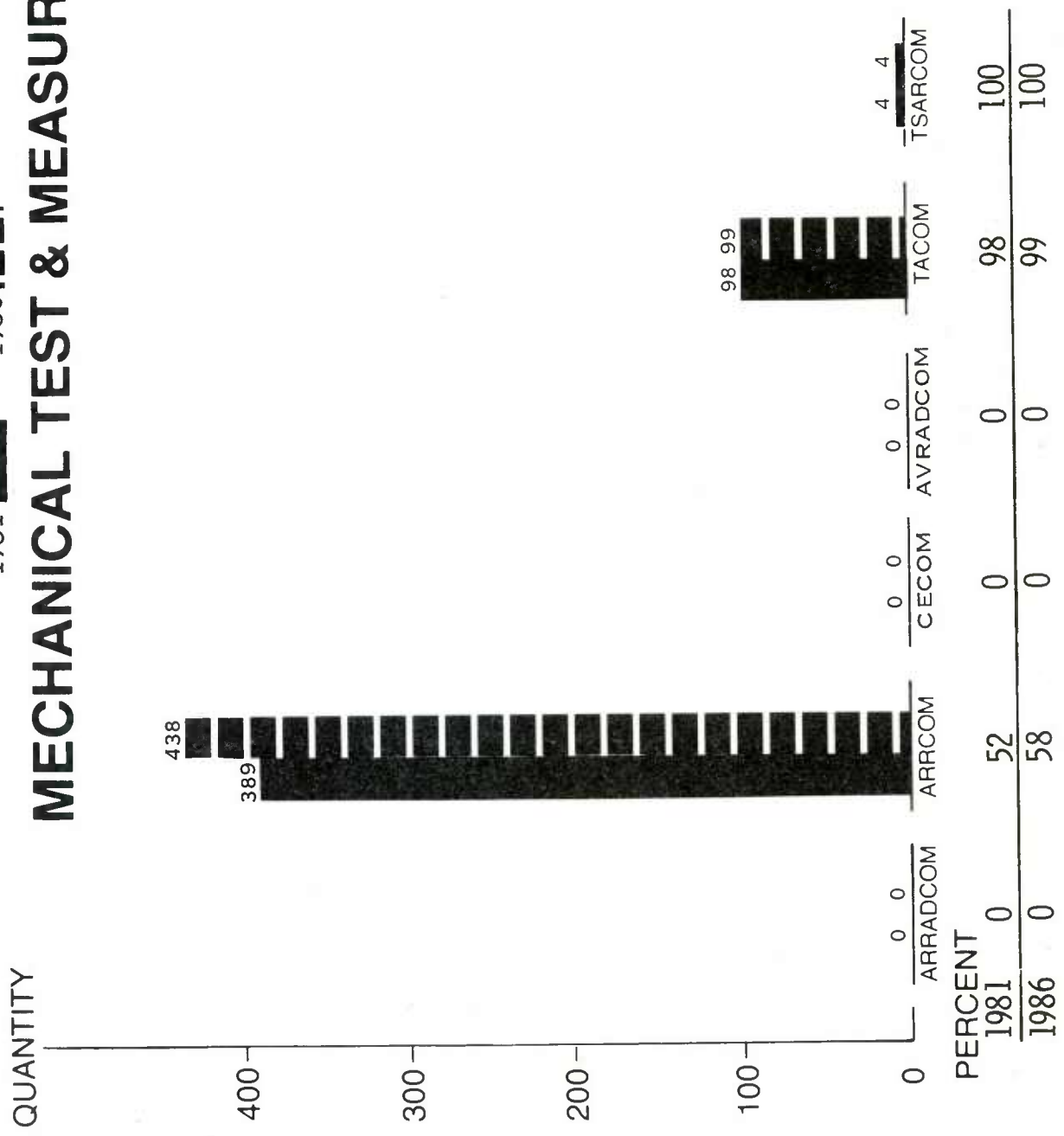


FIGURE III-24

SECTION IV

NUMERICAL CONTROL (NC)

Numerical control (NC) is applied to eight classes of metalworking equipment owned by the Army. These classes are: boring, drilling, lathes, milling, machining centers, punching, grinding, and forging. The Army inventory of this equipment is shown in Figure IV-1. Boring machines, lathes, and machining centers make up 78 percent of the inventory, or 499 items. Punching, grinding, and forging machines represent only two percent of the inventory, or 14 items.

Numerically controlled machines make a significant contribution to the production capacity of the industrial base and represent a sizeable investment. The Army numerical control inventory consists of 640 items with an acquisition cost of \$135,361,626. All but four of these items are controlled by DARCOM. The distribution of the NC inventory is shown in Figure IV-2. Government-owned, Government-operated (GOGO) facilities are using 30 percent, or 191, of the items and have an additional three percent, or 17 items, declared idle, i.e., subject to intermittent use, but required to remain in place in support of the current assigned mission. Government-owned, Contractor-operated (GOCO) facilities have 23 percent, or 147 items, and 33 percent, or 212 items, is provided to contractor-owned, contractor-operated facilities as Government furnished equipment, (GFE). The remaining 11 percent, or 73 items, is laidaway in plant equipment packages (PEP's) for possible use in mobilization production.

The trend of the inventory of numerical controlled equipment is shown in Figure IV-3. An increasing trend characterizes the inventory, especially since 1978. The disproportionate increase in acquisition cost shown in 1978 is attributable to the addition of the rotary forge at Watervliet Arsenal at a cost of \$6,749,185. The average cost of numerical control equipment has continued to increase at a rapid rate to \$201,271.

The source of the data for numerical control equipment is the DIPEC SP-50 Report as of 1 May 1981.

NUMERICAL CONTROL INVENTORY BY CLASS

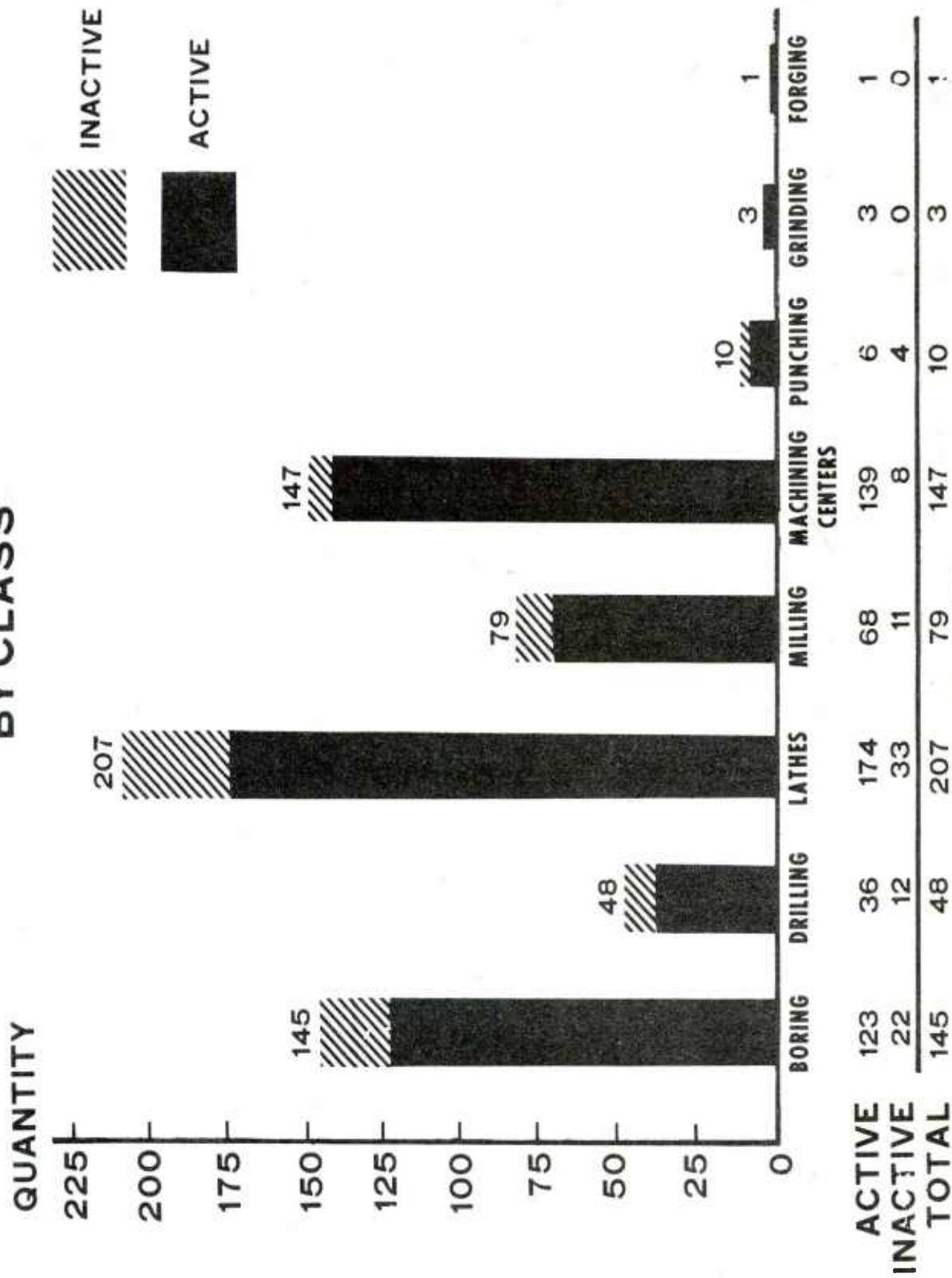


FIGURE IV-1

DISTRIBUTION OF NUMERICAL CONTROL INVENTORY QUANTITY & USE

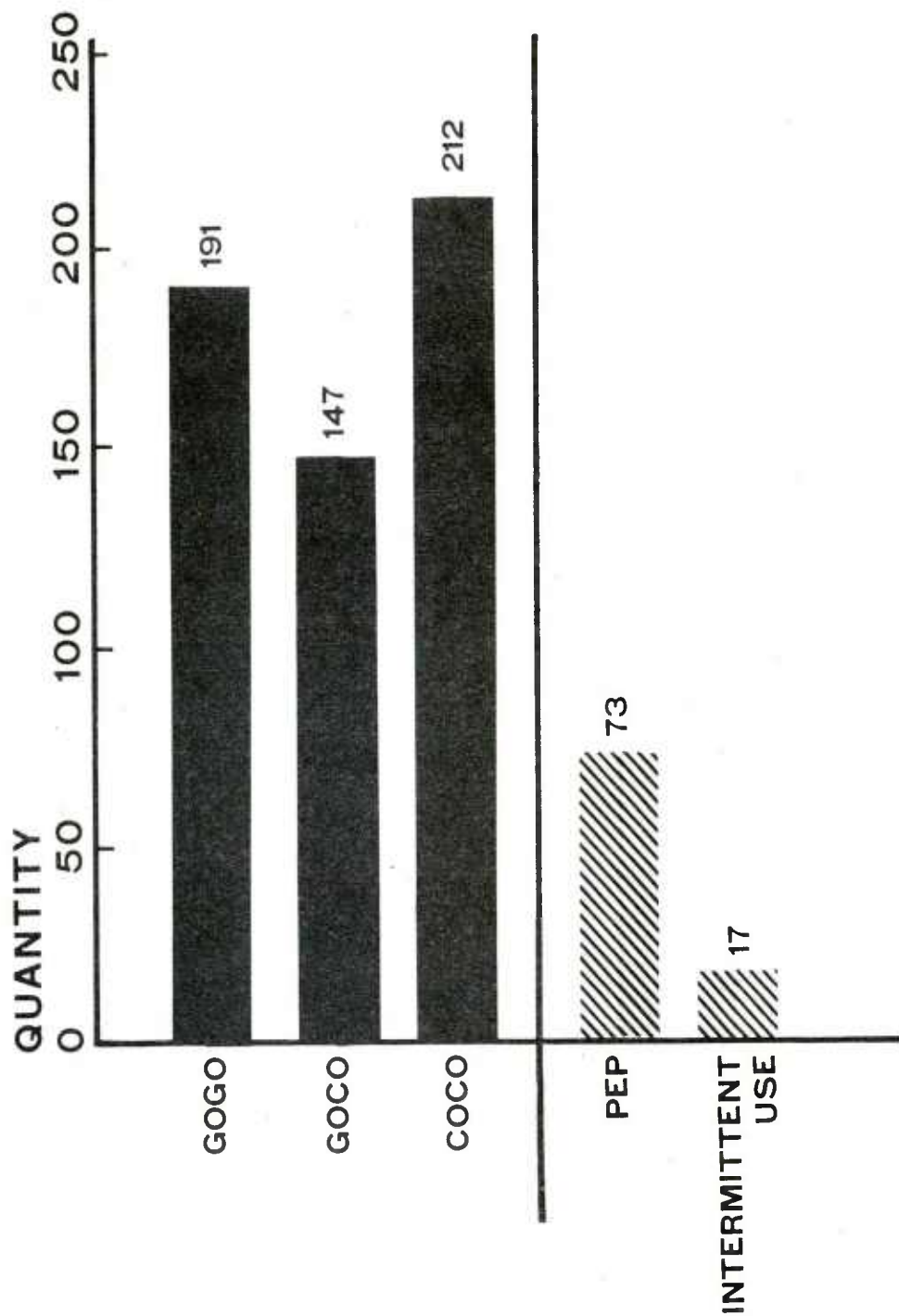
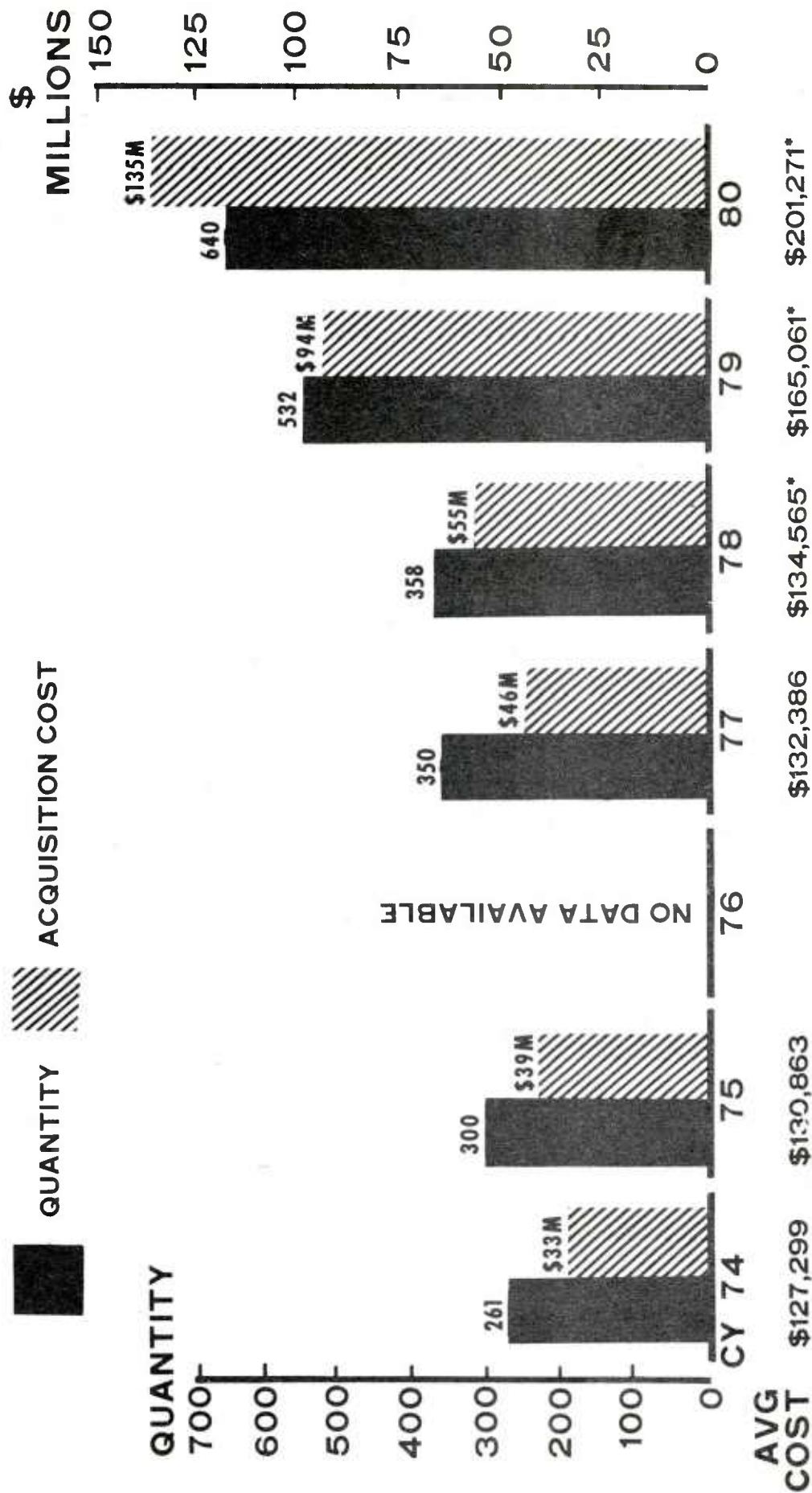


FIGURE IV-2

INVENTORY TRENDS NUMERICAL CONTROL EQUIPMENT



NOTE: * AVERAGE COST DOES NOT INCLUDE THE ROTARY FORCE AT WATERVLIET ARSENAL WITH A COST OF \$6,749,185.

FIGURE IV-3

APPENDIX A

Illustrations of Industrial Plant Equipment (IPE)

with

Federal Supply Classes (FSC)

APPENDIX A

Illustrations of Industrial Plant Equipment (IPE)

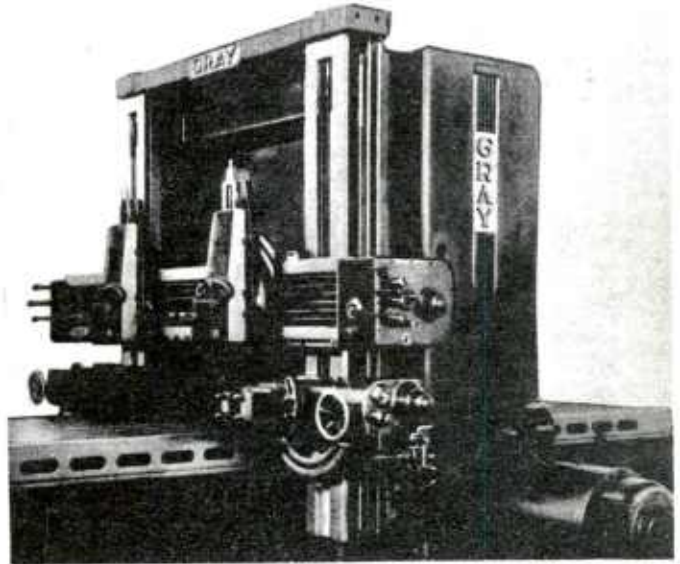
with

Federal Supply Classes (FSC)

METALCUTTING

FSC

- 3405 Saw and Filing Machines
- 3408 Machining Centers and
Way Type Machines
- 3410 Electrical and Ultrasonic
Erosion Machines
- 3411 Boring Machines
- 3412 Broaching Machines
- 3413 Drilling and Tapping
Machines
- 3414 Gear Cutting and Finishing
Machines
- 3415 Grinding Machines
- 3416 Lathes
- 3417 Milling Machines
- 3418 Planers and Shapers
- 3419 Miscellaneous Machine Tools



72" x 72" x 20'
PLANER

WELDING

FSC

- 3431 Electric Arc Welding Equipment
- 3432 Electric Resistance Welding
Equipment
- 3433 Gas Welding, Heat Cutting and
Metalizing Equipment
- 3436 Welding Positioners and
Manipulators
- 3438 Miscellaneous Welding Equipment

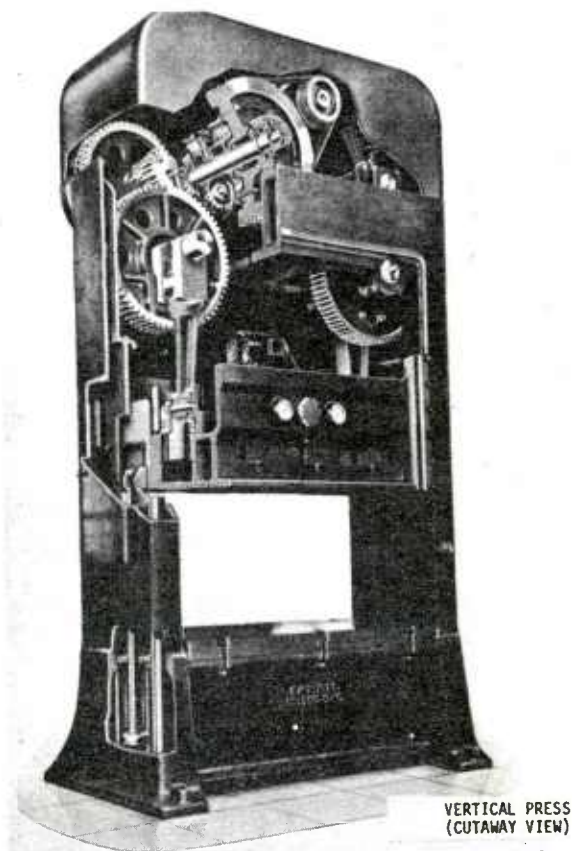


ENGINE DRIVEN
ARC WELDER

METAL FORMING

FSC

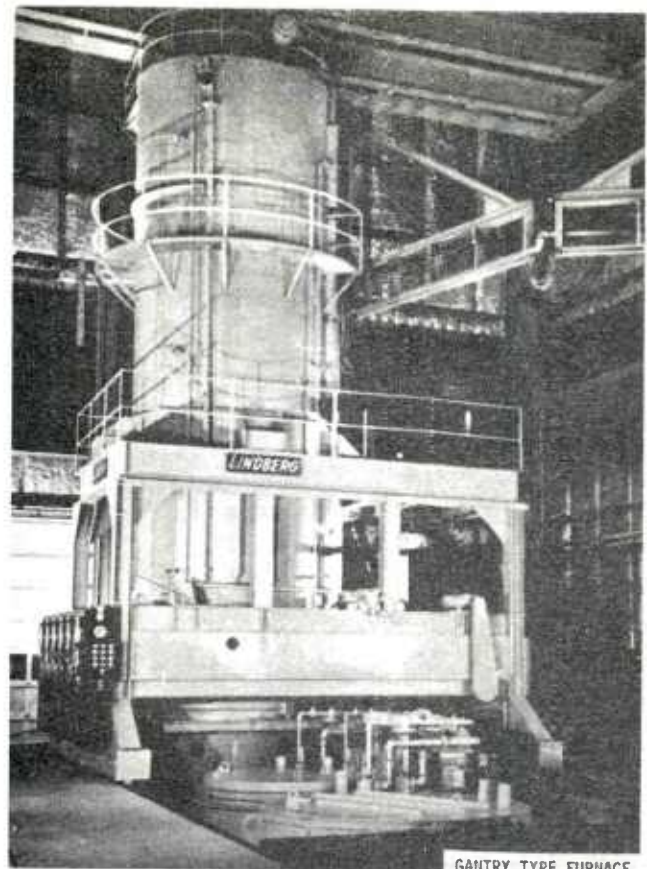
- 3422 Rolling Mills and Drawing Machines
- 3441 Bending and Forming Machines
- 3442 Hydraulic and Pneumatic Presses, Power Driven
- 3443 Mechanical Power Presses, Power Driven
- 3444 Manual Presses
- 3445 Punching and Shearing Machines
- 3446 Forging Machinery and Hammers
- 3447 Wire and Metal Ribbon Forming Machines
- 3448 Riveting Machines



HEAT TREAT AND FURNACES

FSC

- 3424 Metal Heat Treating and
Nonthermal Treating
Equipment
- 4430 Industrial Furnaces, Kilns,
Lehrs, and Ovens



GANTRY TYPE FURNACE

ELECTRICAL TESTING AND MEASURING DEVICES

FSC

- 6625 Electrical and Electronic
Properties Measuring and
Testing Instruments

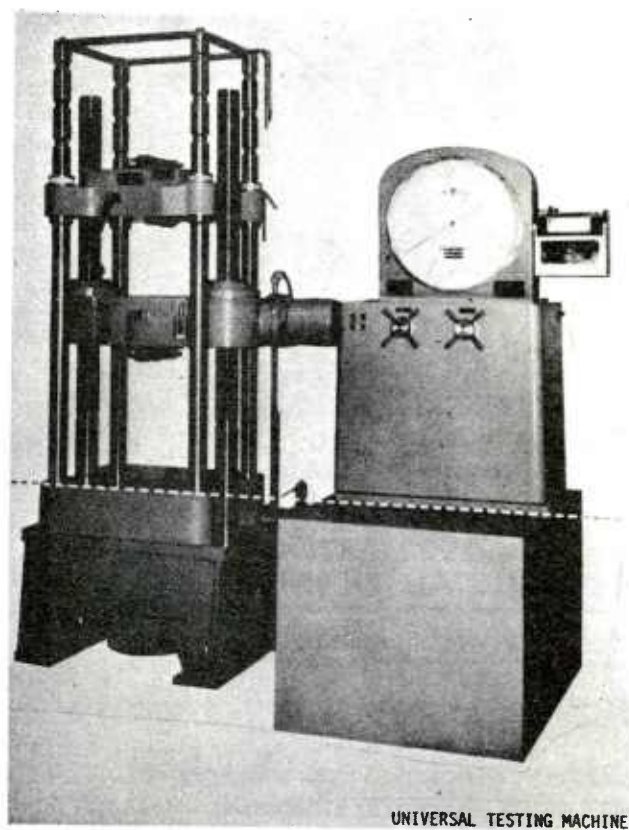


DIGITAL MULTIMETER
(TEST EQUIPMENT)

MECHANICAL TESTING AND MEASURING DEVICES

FSC

6635 Physical Properties Testing
 Equipment



UNIVERSAL TESTING MACHINE